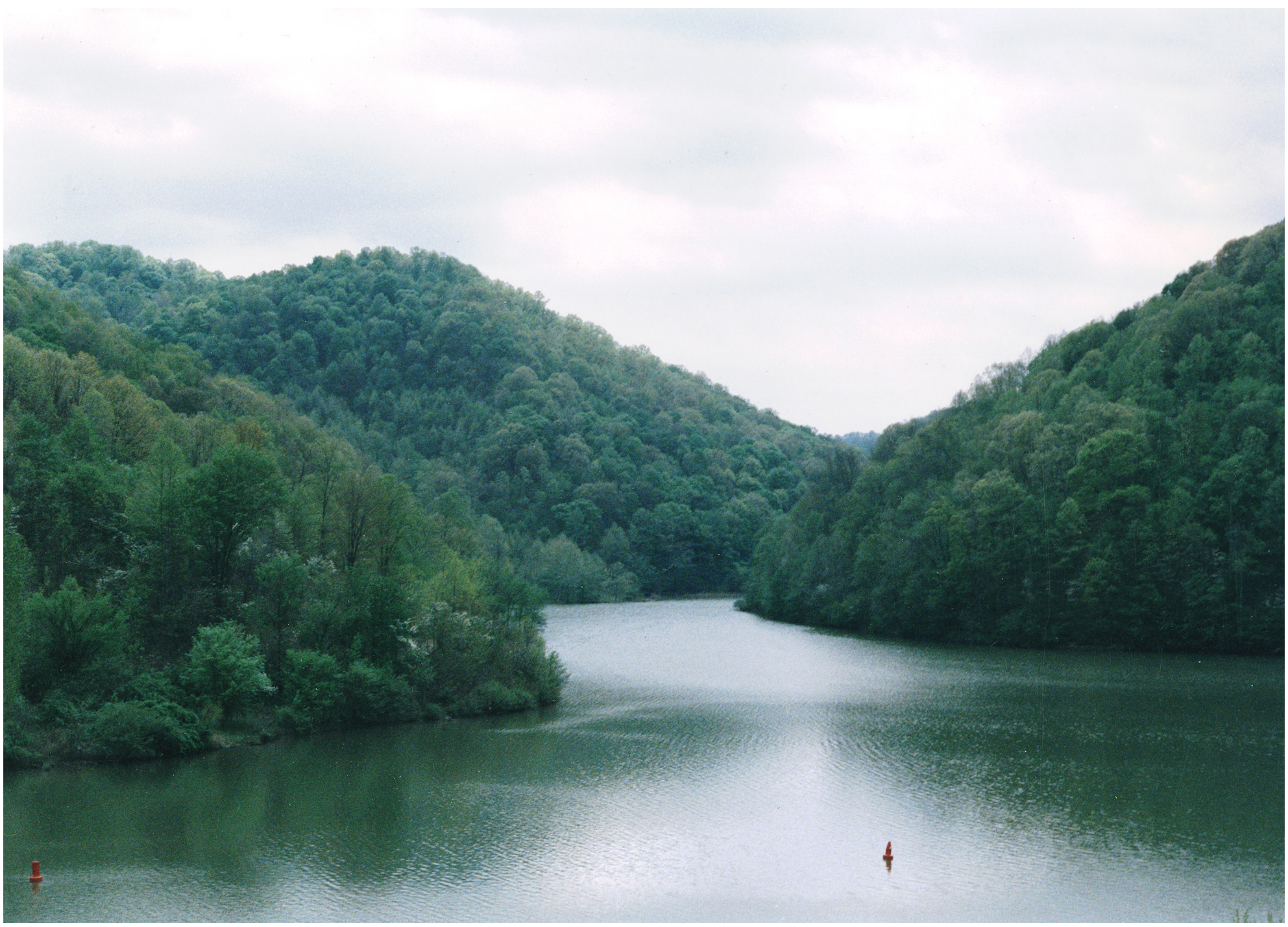
United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
West Virginia Agricultural
and Forestry Experiment
Station

Soil Survey of Wayne County, West Virginia

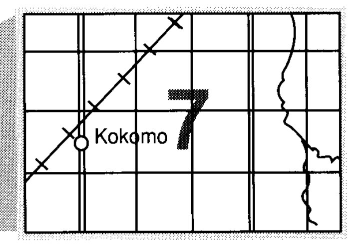


How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

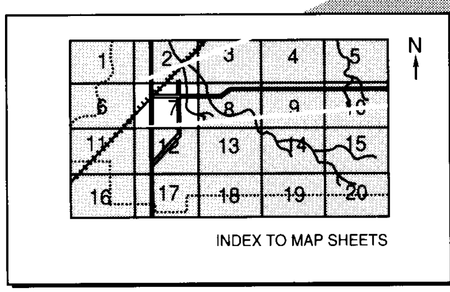
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.



MAP SHEET

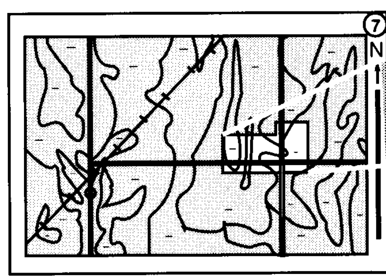
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



INDEX TO MAP SHEETS

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.



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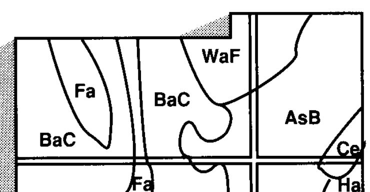

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

Locate your area of interest on the map sheet. Note the map units symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

This survey updates the "Soil Survey of the Huntington Area, West Virginia," printed in 1912 (USDA, 1912). It provides additional information and has larger scale maps, which show the soils in greater detail.

Major fieldwork for this soil survey was completed in 1992. Soil names and descriptions were approved in 1993. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1992. This survey was made cooperatively by the Natural Resources Conservation Service and the West Virginia Agricultural and Forestry Experiment Station. The survey is part of the technical assistance furnished to the Guyan Soil Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: East Lynn Lake at Kiahsville. The surrounding landscape is typical of the Dekalb-Latham-Gilpin general soil map unit.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

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Issued 1999

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

William J. Hartman
State Conservationist
Natural Resources Conservation Service

Soil Survey of Wayne County, West Virginia

By Carlos P. Cole, Eric N. Thompson, Douglas A. Adamo, Phillip D. Dixon, Ross J. Fugill, and Scott L. Hoover, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
West Virginia Agricultural and Forestry Experiment Station

WAYNE COUNTY is situated in the southwestern part of West Virginia (fig. 1). The county has a total area of about 512 square miles, or 327,900 acres, 4,775 acres of which is water.

The population of Wayne County was 41,636 in 1990. In that year, Wayne, the county seat, had a population of 1,128, making it the third largest city in the survey area, and Kenova, the largest city entirely within the county, had a population of 3,748. The Westmoreland district of the city of Huntington is in Wayne County.

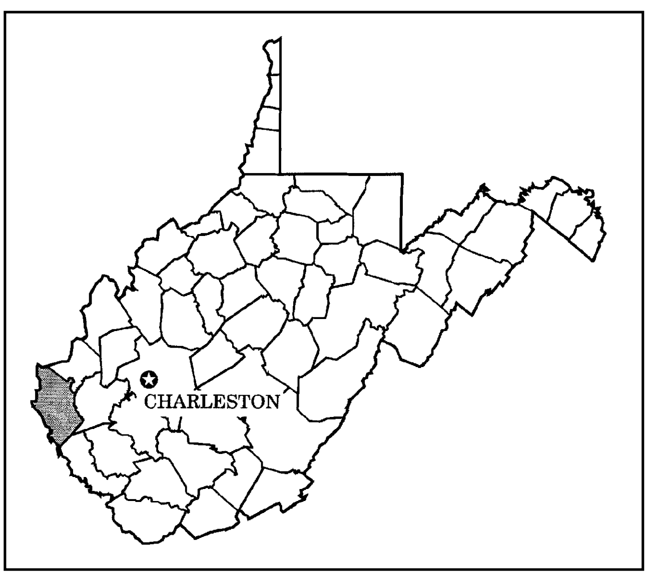

Figure 1.—Location of Wayne County in West Virginia.

The major industrial products in the county are coal, natural gas, lumber, cement, and concrete. Public recreational areas make up a significant part of the county. Two flood-control reservoirs on the Twelvepole Creek drainage, Beech Fork and East Lynn Lakes, provide 1,725 acres of water (U.S. Army Corps of Engineers, 1989) and 34,888 acres of land (USDA, 1987 and 1988) for boating, camping, fishing, hiking, hunting, picnicking, and swimming. Similar recreational opportunities, except for boating, are available on more than 8,000 acres in the Cabwaylingo State Forest, near the headwaters of Twelvepole Creek.

The transportation needs of Wayne County are served by Federal and State roads, railroads, airports, and barges. Interstate 64 and U.S. Highway 60 run east and west in the extreme northern part of the county. U.S. Highway 52 follows the Big Sandy River and the Tug Fork of the Big Sandy River. The rest of the county is served by West Virginia State Highways 37, 75, and 152 and by numerous county highways. The two railroads in the county follow the drainage of the Big Sandy River and Twelvepole Creek. The Tri-State Airport, located directly south of Ceredo, provides passenger and air freight service. The Big Sandy and Ohio Rivers provide barge service for the industries of the county.

General Nature of the County

This section gives general information about the county. It describes settlement, farming, relief and drainage, geology, and climate.

Settlement

The first settler in Wayne County was possibly Stephen Kelley. He settled at the mouth of the Big Sandy River in 1798. Wayne County was formed from Cabell County in January 1842 and was named in honor of Anthony Wayne, a general in the Revolutionary War. Wayne, the county seat, was first called Trout Hill in honor of Abraham Trout, who was owner of the land. Its name was changed later to Fairview and finally, in 1911, was changed again to its present name (Krebs and Teets, 1913).

Farming

The 1987 Census of Agriculture reports 193 farms in Wayne County and a total farm acreage of 26,728. The total number of farms decreased from 200 since 1982, and the average farm size decreased from 140 acres in 1982 to 138 in 1987 (U.S. Department of Commerce, 1989). The chief agricultural products in the county are hay and grain, tobacco, livestock, dairy products, poultry, fruit, vegetables, and sorghum (Holmes, 1991).

According to the 1982 Census of Agriculture, the total acreage of cropland in the county was 9,460 acres and the total acreage of pasture was 5,872 acres. The total acreage of cropland increased to 9,571 acres by 1987 (U.S. Department of Commerce, 1989).

Relief and Drainage

Wayne County is in two major land resource areas—the Central Allegheny Plateau and the Cumberland Plateau and Mountains. The Central Allegheny Plateau occupies the northern half of the county. The topography includes narrow, nearly level valleys and narrow, strongly sloping and moderately steep ridgetops separated by long, steep and very steep side slopes. Elevation in this part of the county ranges from 515 feet at the normal pool level of the Ohio River to more than 1,200 feet on some ridgetops near Wayne.

The Cumberland Plateau and Mountains occupies the southern half of the county. The highly dissected topography includes narrow flood plains along streams and narrow, moderately steep and steep ridgetops or crests separated by long, very steep side slopes (USDA, 1981). Elevation in this part of the county ranges from about 530 feet in an area along the Big Sandy River at Fort Gay to 1,544 feet at the summit of a high knob south of Wilsondale, near the Mingo County line.

Twelvepole Creek and the Ohio River drain the eastern two-thirds of the county. The Big Sandy River and its tributary, the Tug Fork, drain the western one-third of the county

Geology

Gordon B. Bayles, State Geologist, Natural Resources Conservation Service, helped prepare this section.

In Wayne County, the surface rocks, with the exception of the Quaternary deposits covering the valley floors of the streams, are all of the Paleozoic Era and more specifically of the Pennsylvanian Period (West Virginia Geological and Economic Survey, 1968). All of the exposed rocks are sedimentary in origin and show little local folding or disturbance.

The northern half of the county is characterized by interbedded red and gray shale, siltstone, sandstone, thin limestone, and coal of the Conemaugh Group. The ridgetops in the northeastern part of the county are capped by the similar Monongahela Group. Upshur soils are typical of this area and are dominantly in areas of the Monongahela Group.

The southern half of the county is characterized by the interbedded sandstone, siltstone, shale, limestone, and coal of the Allegheny and Kanawha Formations. Most of the ridgetops in this part of the county are capped by the Conemaugh Group. The southern half of the county has a higher percentage of sandstone bedrock and exhibits a more rugged topography than the northern half.

Many of the residual soils in the county occur across all geologic formations. For example, Gilpin and Latham soils are in areas of all geologic formations in the county but are somewhat rare in areas of the Kanawha Formation. From north to south, the bedrock in Wayne County contains an increasing amount of sandstone. As a result, Dekalb soils are of relatively minor extent in the extreme northern part of the county but are the dominant residual soils in the extreme southern part.

Climate

Table 1 gives data on temperature and precipitation for the county as recorded at Wayne in the period 1963 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 33 degrees F and the average daily minimum temperature is 22 degrees. The lowest temperature on record, which occurred at Wayne on January 19, 1977, is -9 degrees. In summer, the average temperature is 73 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Wayne on July 9, 1980, is 101 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 39.9 inches. Of this, more than 22 inches, or about 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 3.50 inches at Wayne on July 10, 1980. Thunderstorms occur on about 43 days each year. Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

The average seasonal snowfall is about 18 inches. The greatest snow depth at any one time during the period of record was 18 inches. On the average, 11 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 8 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the county. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the county are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the county and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the county and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the county, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the county, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Some areas delineated on the general soil map of Wayne County join with areas of Cabell County. There are differences in map unit names and in proportions of component soils between the two counties because of variations in the map scale and in the degree of generalization.

Soils on Terraces and Flood Plains

1. Urban land-Ashton-Lindside

Urban land and very deep, well drained and moderately well drained, nearly level and gently sloping soils formed in loamy alluvium; on protected flood plains

This map unit consists of Urban land and soils in urban areas near the Ohio and Big Sandy Rivers. The flood walls around Ceredo, Huntington, and Kenova protect this unit from flooding. Slope ranges from 0 to 8 percent.

This unit makes up about 1 percent of the survey area. It is about 47 percent Urban land, 10 percent Ashton soils, 6 percent Lindside soils, and 37 percent soils of minor extent. The minor soils are Chagrin, Guyan, Melvin, and Wheeling soils on flood plains and low terraces; Beech soils on foot slopes; Gilpin and Upshur soils on uplands; and Udorthents.

Urban land is primarily covered by streets, parking lots, buildings, and other structures in residential and business areas.

The well drained, nearly level and gently sloping Ashton soils are on high flood plains. They have a very dark grayish brown, medium textured surface layer and a dark yellowish brown and yellowish brown, medium textured and moderately fine textured subsoil. These soils formed in alluvium derived from acid and limy soils on uplands.

The moderately well drained, nearly level Lindside soils are on flood plains. They have a brown, medium textured surface layer and a yellowish brown, moderately fine textured subsoil. These soils formed in alluvium derived from limy and acid soils on uplands.

Most areas of this map unit are used for residential, business, or industrial development. Open areas are used primarily for lawns.

Low soil strength and a seasonal high water table are limitations affecting most urban uses.

2. Grigsby-Lobdell-Chagrin

Very deep, well drained and moderately well drained, nearly level soils formed in loamy alluvium; on flood plains

This map unit consists of soils on flood plains along Twelvepole Creek and its tributaries. The flood plains are low adjacent to streams and higher toward the hills. Slope ranges from 0 to 3 percent.

This unit makes up about 3 percent of the survey area. It is about 24 percent Grigsby soils, 22 percent Lobdell soils, 21 percent Chagrin soils, and 33 percent soils of minor extent and Urban land. The minor soils are Melvin soils on flood plains; Cotaco, Guyan, Kanawha, and Markland soils on high flood plains and low terraces; Allegheny soils on high terraces; Beech soils on foot slopes; and Udorthents.

Grigsby soils are well drained. They have a brown, medium textured and moderately coarse textured surface layer and a brownish yellow and yellowish brown, moderately coarse textured subsoil. These soils formed in alluvium derived from acid and limy soils on uplands.

Lobdell soils are moderately well drained . They have a brown, medium textured surface layer and a dark yellowish brown, medium textured subsoil. These soils formed in alluvium derived from acid and limy soils on uplands.

Chagrin soils are well drained. They have a brown, medium textured surface layer and a dark yellowish brown, medium textured subsoil. These soils formed in alluvium derived from acid and limy soils on uplands.

Most areas of this map unit are used as cropland or hayland or for urban development. A few areas are used as pasture or woodland. Urban development is steadily expanding, especially near the towns of Lavalette and Wayne.

Flooding and a seasonal high water table are limitations affecting most urban uses.

3. Gilpin-Cotaco-Allegheny

Moderately deep, very deep, and deep, well drained and moderately well drained, nearly level to steep soils formed in residuum or loamy alluvium; on uplands and terraces

This map unit consists of the less sloping areas in the vicinity of Buffalo, Dock, Gragston, and Miller Creeks in the northwest part of the county. The unit consists of old alluvial or lacustrine deposits on gently sloping to strongly sloping terraces with moderately steep and steep residual or colluvial escarpments in downslope areas toward the low terraces and flood plains along the present drainageways. Terraces from lacustrine deposits are buried in some areas by more recent alluvium. Slope ranges from 0 to 35 percent.

This unit makes up about 2 percent of the survey area. It is about 17 percent Gilpin soils, 16 percent Cotaco soils, 15 percent Allegheny soils, and 52 percent soils of minor extent. The minor soils are Chagrin, Grigsby, Lobdell, and Melvin soils on flood plains; Guyan, Kanawha, and Markland soils on high flood plains and low terraces; Beech soils on foot slopes; Upshur soils on uplands; and Udorthents.

The strongly sloping to steep Gilpin soils are on uplands. They are moderately deep and well drained. They have a brown, medium textured surface layer and a dark yellowish brown and yellowish brown, medium textured and moderately fine textured subsoil. These soils formed in acid material weathered from interbedded siltstone, shale, and sandstone.

The nearly level and gently sloping Cotaco soils are on low terraces. They are very deep and moderately well drained. They have a brown, medium textured surface layer and a yellowish brown, brownish yellow, and light gray, medium textured and moderately fine textured subsoil. These soils formed in alluvium derived from acid soils on uplands.

The strongly sloping Allegheny soils are on high terraces. They are deep and well drained. They have a brown, medium textured surface layer and a yellowish brown and strong brown, medium textured, moderately fine textured, and moderately coarse textured subsoil. These soils formed in alluvium derived from acid soils on uplands.

Most areas of this map unit are used as cropland, hayland, or pasture or for urban development. Urban development is steadily expanding in areas near the Big Sandy River.

The depth to bedrock, flooding, a seasonal high water table, and slope are limitations affecting most urban uses.

4. Kanawha-Udorthents-Huntington

Areas of very deep, well drained, nearly level and gently sloping soils formed in loamy alluvium and areas of Udorthents; on flood plains and low terraces

This map unit consists of soils on flood plains and terraces along the Big Sandy River and the Tug Fork of the Big Sandy River. Narrow, low flood plains are adjacent to streams and are below areas of much wider flood plains or low terraces. The soils on low flood plains are frequently flooded and have developed a deep, organic surface layer with common coal fragments. Slope ranges from 0 to 8 percent.

This unit makes up about 1 percent of the survey area. It is about 27 percent Kanawha soils, 26 percent Udorthents, 13 percent Huntington soils, and 34 percent soils of minor extent and Urban land. The minor soils are Ashton, Cotaco, Guyan, and Melvin soils on flood plains and low terraces and Nelse soils on streambanks.

The nearly level and gently sloping Kanawha soils are on high flood plains and low terraces. They have a dark brown, medium textured surface layer and a strong brown and yellowish brown, moderately fine textured and moderately coarse textured subsoil. These soils formed in alluvium derived from acid and limy soils on uplands.

The nearly level and gently sloping Udorthents are on flood plains and low terraces. They have varied textures and colors. These soils are along highways and railroads and in other areas that have been excavated and/or filled.

The nearly level Huntington soils are on flood plains. They have a very dark grayish brown, medium textured surface layer and a brown and dark yellowish brown, medium textured and moderately coarse textured subsoil. These soils formed in recent alluvium derived from acid and limy soils on uplands.

Most areas of this map unit are used as cropland or hayland or for urban development. A few areas are used as pasture. Urban development is steadily expanding, mostly in the northern part of the area.

Flooding and low soil strength are limitations affecting most urban uses.

5. Udorthents-Nelse

Udorthents and very deep, well drained, nearly level to moderately steep soils formed in sandy and loamy alluvium; on streambanks, flood plains, and low terraces

This map unit consists of soils on streambanks, flood plains, and terraces along the Tug Fork of the Big Sandy River. Narrow streambanks are below narrow flood plains or terraces. The soils on the streambanks are frequently flooded and commonly are stratified. Slope ranges from 0 to 25 percent.

This unit makes up less than 1 percent of the survey area. It is about 51 percent Udorthents, 24 percent Nelse soils, and 25 percent soils of minor extent and Urban land. The minor soils are Cotaco and Kanawha soils on high flood plains and low terraces.

The nearly level and gently sloping Udorthents are on flood plains and low terraces. They have varied textures and colors. These soils are along highways and railroads and in other areas that have been excavated and/or filled.

The gently sloping to moderately steep Nelse soils are on streambanks. They have a very dark grayish brown, medium textured surface layer and an olive brown, yellowish brown, and brown, coarse textured substratum. These soils formed in recent alluvium derived from acid and limy soils on uplands.

Most areas of this map unit are used for urban development (fig. 2), highways, railroads, or woodland. Woody vegetation is maintained along the streambanks to prevent stream erosion during the frequent floods.

Flooding and slope are limitations affecting most urban uses.

Figure 2.—The town of Crum is in the Udorthents-Nelse general soil map unit, which is along the Tug Fork of the Big Sandy River. The surrounding hills are in the Dekalb-Pineville-Guyandotte general soil map unit .

Soils on Strongly Dissected Uplands

6. Gilpin-Upshur-Beech

Moderately deep, deep, and very deep, well drained and moderately well drained, strongly sloping to very steep soils formed in residuum or colluvium; on uplands

This map unit consists of soils on side slopes, ridgetops, and foot slopes and in coves. It is in the northern part of the county. It is characterized by broad ridgetops and a “bench and break” landscape on the side slopes. The steep and very steep side slopes have strongly sloping and moderately steep benches and ridgetops. Slope ranges from 8 to 65 percent.

This unit makes up about 20 percent of the survey area. It is about 41 percent Gilpin soils, 19 percent Upshur soils, 13 percent Beech soils, and 27 percent soils of minor extent and Urban land. The minor soils are Cotaco and Lobdell soils on flood plains and low terraces; Fiveblock soils in surface-mined areas; Dekalb, Dormont, and Latham soils on uplands; and Udorthents.

The moderately deep, strongly sloping to very steep Gilpin soils are on side slopes, ridgetops, and benches. They are well drained. They have a brown, medium textured surface layer and a dark yellowish brown and yellowish brown, medium textured and moderately fine textured subsoil. These soils formed in acid material weathered from interbedded siltstone, shale, and sandstone.

The deep, strongly sloping to very steep Upshur soils are on benches, side slopes, and ridgetops. They are well drained. They have a brown, medium textured surface layer and a brown, reddish brown, dark reddish brown, and weak red, medium textured and fine textured subsoil. These soils formed in limy material weathered from shale.

The very deep, strongly sloping to steep Beech soils are on foot slopes, in upland drainageways, and in coves. They are moderately well drained. They have a brown, medium textured surface layer and a yellowish brown and strong brown, medium textured and moderately fine textured subsoil. These soils formed in colluvium.

Land use in areas of this map unit varies with the topography. The steep and very steep side slopes generally are used as woodland, but a few areas have been cleared and are used as pasture. Roughly half of the acreage on ridgetops and foot slopes is used as pasture, hayland, or cropland, and the rest of this acreage is used as woodland. Nearly all of the soils on flood plains are used as hayland, cropland, or pasture. Terraces, flood plains, and the less sloping uplands near the Ohio River are rapidly being urbanized.

The depth to bedrock, low soil strength, a moderate or high shrink-swell potential, moderately slow or slow permeability, a seasonal high water table, slippage, and slope are limitations affecting most urban uses.

7. Dekalb-Latham-Gilpin

Moderately deep, well drained and moderately well drained, strongly sloping to very steep soils formed in residuum; on uplands

This map unit consists of soils on side slopes, benches, and ridgetops in the central third of the county. From north to south, the terrain in this unit becomes progressively more rugged and dissected. Slope ranges from 8 to 65 percent.

This unit makes up about 48 percent of the survey area. It is about 28 percent Dekalb soils, 15 percent Latham soils, 14 percent Gilpin soils, and 43 percent soils of minor extent. The minor soils are Cotaco, Grigsby, and Lobdell soils on flood plains and low terraces; Allegheny soils on high terraces; Beech, Buchanan, and Pineville soils on foot slopes and in coves; Fiveblock soils in surface-mined areas; Dormont and Upshur soils on uplands; and Udorthents.

The moderately steep to very steep Dekalb soils are on side slopes and ridgetops. They are well drained. They have a very dark grayish brown, moderately coarse textured surface layer and a brown and yellowish brown, moderately coarse textured subsoil. These soils formed in acid material weathered from sandstone.

The strongly sloping to steep Latham soils are on side slopes, benches, and ridgetops. They are moderately well drained. They have a dark brown, medium textured surface layer and a yellowish brown and light yellowish brown, medium textured, moderately fine textured, and fine textured subsoil. These soils formed in acid material weathered from interbedded shale and siltstone.

The strongly sloping to very steep Gilpin soils are on side slopes, ridgetops, and benches. They are well drained. They have a brown, medium textured surface layer and a dark yellowish brown and yellowish brown, medium textured and moderately fine textured subsoil. These soils formed in acid material weathered from interbedded siltstone, shale, and sandstone.

Most of the acreage on side slopes and foot slopes in this map unit is used as woodland. Some areas of the less sloping ridgetops, coves, benches, and foot slopes are used as hayland or pasture. Many of the areas on flood plains and terraces are used as cropland or hayland. Developed areas are primarily on terraces, the lower foot slopes, and flood plains.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, slippage, slope, and slow permeability are limitations affecting most urban uses.

8. Dekalb-Pineville-Guyandotte

Moderately deep and very deep, well drained, moderately steep to very steep soils formed in residuum or colluvium; on uplands

This map unit is in the southern third of the county. It consists of soils on moderately steep and steep, narrow ridgetops and very steep side slopes with moderately steep and steep benches and foot slopes. Colluvium is on side slopes adjacent to residual soils, in coves, and on foot slopes above drainageways. The rugged landscape has been dissected by many small, steep, erosional drainageways. Slope ranges from 8 to 65 percent.

This unit makes up about 24 percent of the survey area. It is about 31 percent Dekalb soils, 17 percent Pineville soils, 11 percent Guyandotte soils, and 41 percent soils of minor extent (fig. 3). The minor soils are Grigsby soils on flood plains; Buchanan soils on foot slopes and in coves; Fiveblock soils in surface-mined areas; Dormont, Gilpin, and Latham soils on uplands; and Udorthents.

The steep and very steep Dekalb soils are on side slopes and ridgetops. They are moderately deep. They have a very dark grayish brown, moderately coarse

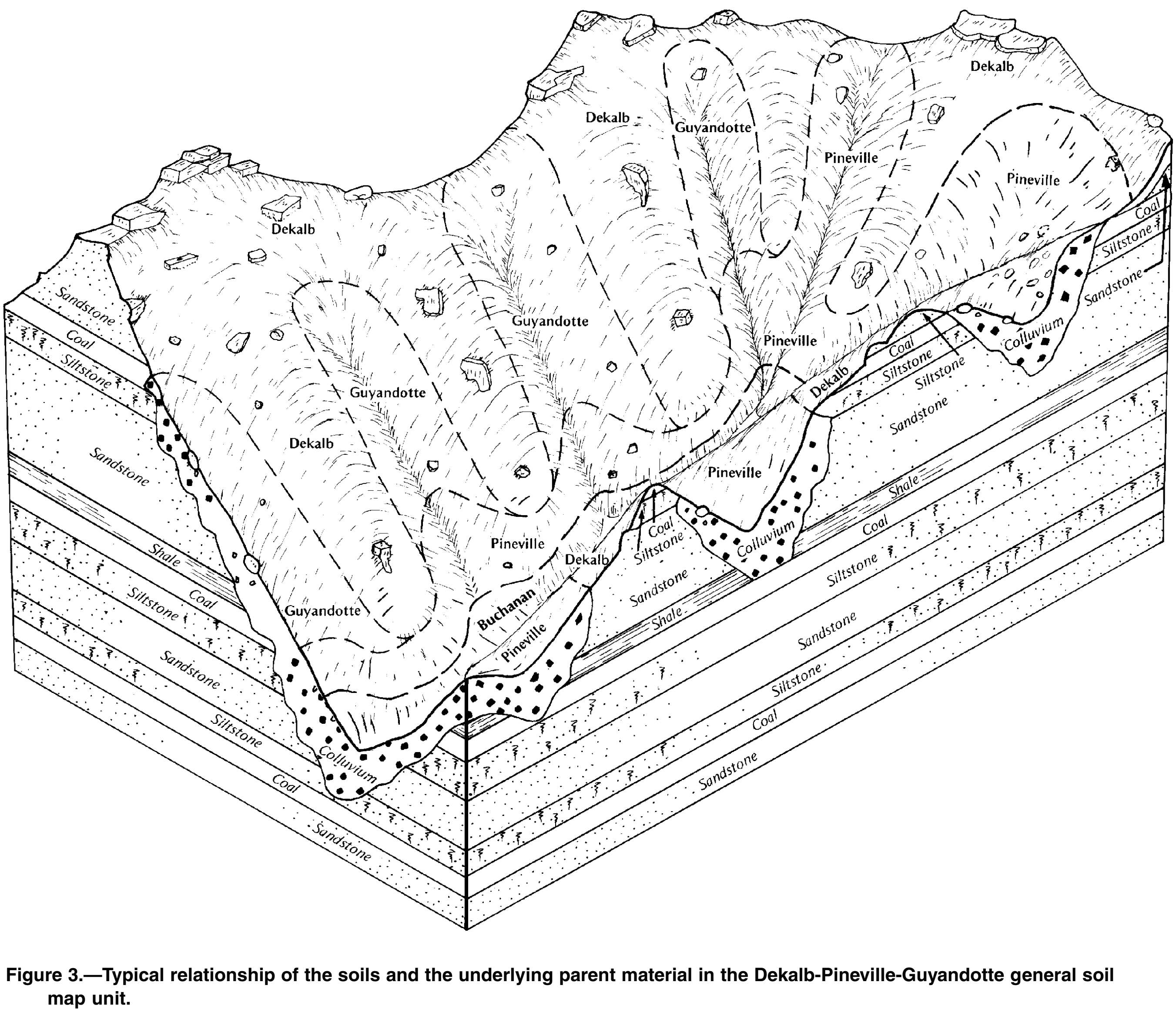

Figure 3.—Typical relationship of the soils and the underlying parent material in the Dekalb-Pineville-Guyandotte general soil map unit.

textured surface layer and a brown and yellowish brown, moderately coarse textured subsoil. These soils formed in acid material weathered from sandstone.

The moderately steep to very steep Pineville soils are on the lower side slopes, on foot slopes, and in coves. They are very deep. They have a dark brown, medium textured surface layer and a light yellowish brown, reddish yellow, and yellowish brown, medium textured subsoil. These soils formed in colluvium.

The very steep Guyandotte soils are on north-facing side slopes and in coves. They are very deep. They have a very dark grayish brown, medium textured surface layer and a brown, dark yellowish brown, and yellowish brown, medium textured subsoil. These soils formed in colluvium.

Nearly all of the acreage on side slopes and foot slopes in this map unit is used as woodland. Some small areas on the less sloping ridgetops, in coves, and on foot slopes are used as pasture. Many of the flood plains and terraces and a few of the broader ridgetops and less sloping foot slopes are used as hayland or cropland. The developed areas are mostly on terraces, the lower foot slopes, and flood plains, especially near the Tug Fork of the Big Sandy River.

The depth to bedrock and slope are limitations affecting most urban uses.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Beech loam, 8 to 15 percent slopes, is a phase of the Beech series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Gilpin-Upshur complex, 15 to 25 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Dekalb-Pineville-Guyandotte association, very steep, extremely stony, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Pineville and Buchanan channery loams, 15 to 35 percent slopes, extremely stony, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

AgC—Allegheny loam, bedrock substratum, 8 to 15 percent slopes

This soil is deep, strongly sloping, and well drained. It is on high terraces of major drainageways along the Big Sandy River.

Typically, the surface layer is brown loam about 5 inches thick. The subsoil extends to a depth of 40 inches. The upper 4 inches of the subsoil is yellowish brown loam. The next 11 inches is yellowish brown clay loam. The next 10 inches is strong brown sandy clay loam. The lower 10 inches is yellowish brown fine sandy loam. The substratum extends to a depth of 55 inches. The upper 6 inches of the substratum is yellowish brown and strong brown channery fine sandy loam. The lower 9 inches is brownish yellow channery silt loam. Brown shale bedrock is at a depth of 55 inches.

Small areas of the well drained Dekalb, Gilpin, and Upshur soils and the moderately well drained Latham soils are included with this soil in mapping. Also included are small areas of soils that have a subsoil of loamy sand, moderately well drained soils that have a fragipan, soils with a slope of less than 8 percent, soils with a slope of more than 15 percent, and Udorthents. Included soils make up about 20 percent of the unit.

The available water capacity of the Allegheny soil is moderate or high. Permeability is moderate in the subsoil. Runoff is rapid. Natural fertility is low. Where unlimed, this soil is extremely acid to strongly acid. The depth to bedrock is 48 to 60 inches.

Most areas of this soil are used as hayland, pasture, or cropland. A few areas are used for urban development or woodland.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas. If this soil is cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The depth to bedrock and slope limit most urban uses.

The depth to bedrock and slope limit this soil as a site for dwellings with basements. Excavation costs are higher because of the depth to bedrock. Land shaping and grading can minimize the limitation caused by slope. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction can reduce the hazard of erosion. Designing dwellings that conform to the natural slope and setting can keep land shaping, and ultimately erosion, to a minimum.

The depth to bedrock and slope limit this soil as a site for septic tank absorption fields. These limitations can be minimized by installing specially designed absorption fields.

Slope limits this soil as a site for local roads and streets. Constructing the roads and streets on the contour can minimize this limitation.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, slippage, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is IIIe. The woodland ordination symbol is 4A

AsA—Ashton silt loam

This soil is very deep, nearly level, and well drained. It is on high flood plains along the Ohio and Big Sandy Rivers. The soil is subject to rare flooding in winter and early spring. Slope ranges from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsoil extends to a depth of 55 inches. The upper 8 inches of the subsoil is dark yellowish brown silt loam. The next 30 inches is yellowish brown silty clay loam. The lower 7 inches is yellowish brown loam. The substratum is yellowish brown loam, which extends to a depth of at least 65 inches.

Small areas of the well drained Huntington and Kanawha soils, the moderately well drained Cotaco and Lindside soils, the somewhat poorly drained Guyan soils, and the poorly drained Melvin soils are included with this soil in mapping. Also included are small areas of soils that are similar to the Ashton soil but have less silt in the subsoil and small areas of soils with a slope of more than 3 percent. Included soils make up about 20 percent of the unit.

The available water capacity of the Ashton soil is high. Permeability is moderate in the subsoil. Runoff is slow. Natural fertility is high. Where unlimed, this soil is moderately acid to neutral. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as cropland or hayland. A few areas are used for pasture, urban development, or woodland.

This soil is well suited to cultivated crops and to hay and pasture. Crops can be grown year after year on this soil, but cover crops are needed to reduce the hazard of erosion. Crop residue management helps to maintain fertility and tilth. There is a risk of crop damage from flooding early in the growing season. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The hazard of flooding and low soil strength limit most urban uses.

The hazard of flooding limits this soil as a site for dwellings with basements and for septic tank absorption fields.

Low soil strength limits this soil as a site for local roads and streets. Constructing the roads and streets on suitable subgrade can minimize this limitation.

The hazard of flooding, low soil strength, and a seasonal high water table limit use of the included soils for most kinds of urban development.

The capability class is I. The woodland ordination symbol is 5A

BeC—Beech loam, 8 to 15 percent slopes

This soil is very deep, strongly sloping, and moderately well drained. It commonly has seeps and wet-weather springs and is subject to slippage. It is on foot slopes, in upland drainageways, and in coves in the northern and central parts of the county.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to a depth of 51 inches. The upper 15 inches of the subsoil is yellowish brown channery loam. The next 14 inches is strong brown channery clay loam mottled with light brownish gray. The lower 16 inches is yellowish brown very channery loam mottled with light brownish gray. The substratum is strong brown and light gray very channery loam, which extends to a depth of at least 65 inches.

Small areas of the well drained Dekalb, Gilpin, Pineville, and Upshur soils and the moderately well drained Cotaco and Lobdell soils are included with this soil in mapping. Also included are small areas of soils that are less than 60 inches deep over bedrock, soils in areas where 1 to 3 percent of the surface is covered with stones, soils with a slope of less than 8 percent, soils with a slope of more than 15 percent, and bedrock escarpments. Included areas make up about 25 percent of the unit.

The available water capacity of the Beech soil is moderate or high. Permeability is moderately slow or moderate in the subsoil. Runoff is rapid. Natural fertility is moderate. The seasonal high water table is about 1.5 to 3.0 feet below the surface. Where unlimed, this soil is very strongly acid to moderately acid. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as hayland, pasture, or cropland. A few areas are used for urban development or woodland.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas. If this soil is cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

A moderate shrink-swell potential, moderately slow permeability, the seasonal high water table, and slope limit most urban uses.

The seasonal high water table limits this soil as a site for dwellings with basements. Installing foundation drains, sealing foundations, and backfilling with porous material can minimize this limitation.

Moderately slow permeability and the seasonal high water table limit this soil as a site for septic tank absorption fields. These limitations can be minimized by installing specially designed absorption fields.

A moderate shrink-swell potential, the seasonal high water table, and slope limit this soil as a site for local roads and streets. Constructing the roads and streets on the contour and on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The depth to bedrock, the hazard of flooding, low soil strength, a seasonal high water table, a high shrink-swell potential, slippage, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is IIIe. The woodland ordination symbol is 4A.

BeD—Beech loam, 15 to 25 percent slopes

This soil is very deep, moderately steep, and moderately well drained. It commonly has seeps and wet-weather springs and is subject to slippage. It is on foot slopes, in upland drainageways, and in coves in the northern and central parts of the county.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to a depth of 51 inches. The upper 15 inches of the subsoil is yellowish brown channery loam. The next 14 inches is strong brown channery clay loam mottled with light brownish gray. The lower 16 inches is yellowish brown very channery loam mottled with light brownish gray. The substratum is strong brown and light gray very channery loam, which extends to a depth of at least 65 inches.

Small areas of the well drained Dekalb, Gilpin, Pineville, and Upshur soils and the moderately well drained Cotaco and Lobdell soils are included with this soil in mapping. Also included are small areas of soils that are less than 60 inches deep over bedrock, soils in areas where 1 to 3 percent of the surface is covered with stones, soils with a slope of less than 15 percent, soils with a slope of more than 25 percent, and bedrock escarpments. Included areas make up about 25 percent of the unit.

The available water capacity of the Beech soil is moderate or high. Permeability is moderately slow or moderate in the subsoil. Runoff is rapid. Natural fertility is moderate. The seasonal high water table is about 1.5 to 3.0 feet below the surface. Where unlimed, this soil is very strongly acid to moderately acid. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as woodland. A few areas are used for hay, pasture, or urban development.

This soil has limited suitability for cultivated crops and is better suited to hay and pasture. The hazard of erosion is severe in unprotected areas. If this soil is cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, grassed waterways, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees. The hazard of erosion, equipment limitations, and plant competition are management concerns.

The seasonal high water table, slippage, and slope limit most urban uses.

The seasonal high water table, slippage, and slope limit this soil as a site for dwellings with basements. Installing foundation drains, sealing foundations, and backfilling with porous material can minimize the limitation caused by the seasonal high water table. Avoiding unnecessary disturbance of the soil can minimize the hazard of slippage. Land shaping and grading can minimize the limitation caused by slope. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction can reduce the hazards of erosion and slippage. Designing dwellings that conform to the natural slope and setting can keep land shaping, and ultimately erosion, to a minimum.

The seasonal high water table, slippage, and slope limit this soil as a site for septic tank absorption fields. These limitations can be minimized by installing specially designed absorption fields.

Slippage and slope limit this soil as a site for local roads and streets. Avoiding unnecessary disturbance of the soil can minimize the hazard of slippage. Constructing the roads and streets on the contour can minimize the limitation caused by slope.

The depth to bedrock, the hazard of flooding, low soil strength, a seasonal high water table, a high shrink-swell potential, slippage, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is IVe. The woodland ordination symbol is 5R.

BeE—Beech loam, 25 to 35 percent slopes

This soil is very deep, steep, and moderately well drained. It commonly has seeps and wet-weather springs and is subject to slippage (fig. 4). It is on foot slopes, in upland drainageways, and in coves in the northern and central parts of the county.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to a depth of 51 inches. The upper 15 inches of the subsoil is yellowish brown channery loam. The next 14 inches is strong brown channery clay loam mottled with light brownish gray. The lower 16 inches is yellowish brown very channery loam mottled with light brownish gray. The substratum is strong brown and light gray very channery loam, which extends to a depth of at least 65 inches.

Small areas of the well drained Dekalb, Gilpin, Pineville, and Upshur soils and the moderately well drained Cotaco and Lobdell soils are included with this soil in mapping. Also included are small areas of soils that are less than 60 inches deep over bedrock, soils in areas where 1 to 3 percent of the surface is covered with stones, soils with a slope of less than 25 percent, soils with a slope of more than 35 percent, and bedrock escarpments. Included areas make up about 30 percent of the unit.

The available water capacity of the Beech soil is moderate or high. Permeability is moderately slow or moderate in the subsoil. Runoff is very rapid. Natural fertility is moderate. The seasonal high water table is about 1.5 to 3.0 feet below the surface. Where unlimed, this soil is very strongly acid to moderately acid. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as woodland. A few areas are used as pasture.

This soil is not suited to cultivated crops or hay but is suited to pasture. Management concerns are overgrazing and a severe hazard of erosion in unprotected areas. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees. The hazard of erosion, equipment limitations, and plant competition are management concerns.

This soil is poorly suited to most urban uses. The seasonal high water table, slippage, and slope severely limit urban development.

The depth to bedrock, the hazard of flooding, low soil strength, a seasonal high water table, a high shrink-swell potential, slippage, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is VIe. The woodland ordination symbol is 5R.

BuC—Beech-Urban land complex, 3 to 15 percent slopes

This complex consists mainly of a very deep, gently sloping to strongly sloping, moderately well drained Beech soil and Urban land. The Beech soil and Urban land are on the foot slopes and narrow flood plains of drainageways in urbanized areas. Rare, localized flooding may occur in some areas adjacent to streams. The Beech soil and Urban land occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 40 percent Beech loam, 30 percent Urban land, and 30 percent included soils.

Typically, the surface layer of the Beech soil is brown loam about 6 inches thick. The subsoil extends to a depth of 51 inches. The upper 15 inches of the subsoil is yellowish brown channery loam. The next 14 inches is strong brown channery clay loam mottled with light brownish gray. The lower 16 inches is yellowish brown very channery loam mottled with light brownish gray. The substratum is strong brown and light gray very channery loam, which extends to a depth of at least 65 inches.

Urban land is primarily covered by streets, parking lots, buildings, and other structures in residential and business areas.

Small areas of the well drained Chagrin, Gilpin, Kanawha, and Upshur soils, the moderately well drained Cotaco and Lobdell soils, and the somewhat poorly drained Guyan soils are included in this complex in mapping. Also included are small areas of soils with a slope of more than 15 percent, soils with a slope of less than 3 percent, and Udorthents.

The available water capacity of the Beech soil is moderate. Permeability is moderately slow or moderate in the subsoil. Runoff is medium or rapid. Natural fertility is moderate. The seasonal high water table is about 1.5 to 3.0 feet below the surface. Where unlimed, this soil is very strongly acid to moderately acid. The depth to bedrock is more than 60 inches.

Most areas are used for urban development and are not suited to cultivated crops, hay, pasture, or woodland. Open areas are used primarily for lawns.

A moderate shrink-swell potential, moderately slow permeability, the seasonal high water table, and slope limit most urban uses of the Beech soil.

The seasonal high water table limits the Beech soil as a site for dwellings with basements. Installing

Figure 4.—Severe damage to a county road caused by slippage in an area of Beech loam, 25 to 35 percent slopes.

foundation drains, sealing foundations, and backfilling with porous material can minimize this limitation.

Moderately slow permeability and the seasonal high water table limit the Beech soil as a site for septic tank absorption fields. These limitations can be minimized by installing specially designed absorption fields.

A moderate shrink-swell potential, the seasonal high water table, and slope limit the Beech soil as a site for local roads and streets. Constructing the roads and streets on the contour and on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The depth to bedrock, the hazard of flooding, low soil strength, a seasonal high water table, a high shrink-swell potential, slippage, slope, and slow permeability limit use of the included soils for most kinds of urban development.

This unit is not assigned to a capability subclass or woodland ordination symbol.

Ca—Chagrin silt loam

This soil is very deep, nearly level, and well drained. It is on flood plains along Twelvepole Creek and smaller streams in the northern and central parts of the county. This soil is occasionally flooded during winter and early spring. Slope ranges from 0 to 3 percent.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 45 inches. The upper 26 inches of the subsoil is dark yellowish brown silt loam. The lower 11 inches is dark yellowish brown loam. The substratum extends to a depth of at least 65 inches. The upper 7 inches of the substratum is dark yellowish brown loam. The lower 13 inches is yellowish brown sandy loam.

Small areas of the well drained Kanawha and Grigsby soils, the moderately well drained Lobdell soils, and the poorly drained Melvin soils are included with this soil in mapping. Also included are small areas of soils with a slope of more than 3 percent, soils that are subject to frequent flooding, and soils that are subject to rare flooding. Included soils make up about 15 percent of the unit.

The available water capacity of the Chagrin soil is high. Permeability is moderate in the subsoil. Runoff is slow. Natural fertility is high. Where unlimed, this soil is moderately acid to neutral. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as cropland (fig. 5), hayland, or pasture. A few areas are used as woodland.

This soil is suited to cultivated crops and to hay and pasture. Crops can be grown year after year on this soil, but cover crops are needed to reduce the hazard of erosion. Crop residue management helps to maintain fertility and tilth. There is a risk of crop damage from flooding early in the growing season. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The hazard of flooding limits most urban uses. It severely limits this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding limits this soil as a site for local roads and streets. Raised fill above the flood level and cross culverts or another system of surface water removal can minimize this limitation.

The hazard of flooding, low soil strength, and a seasonal high water table limit use of the included soils for most kinds of urban development.

The capability subclass is IIw. The woodland ordination symbol is 5A.

CtA—Cotaco loam, 0 to 3 percent slopes

This soil is very deep, nearly level, and moderately well drained. It is on low terraces along the major streams throughout the county. The soil is subject to rare flooding.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil extends to a depth of 39 inches. The upper 4 inches of the subsoil is yellowish brown loam. The next 5 inches is yellowish brown loam mottled with pale brown. The next 11 inches is brownish yellow clay loam mottled with light gray. The lower 11 inches is brownish yellow and light gray clay loam. The substratum extends to a depth of at least 65 inches. The upper 11 inches of the substratum is brownish yellow and light gray loam. The lower 15 inches is brownish yellow and light gray channery loam.

Small areas of the well drained Kanawha and Chagrin soils, the moderately well drained Markland soils, and the somewhat poorly drained Guyan soils are included with this soil in mapping. Also included are small areas of soils that are not subject to flooding and soils with a slope of more than 3 percent. Included soils make up about 20 percent of the unit.

The available water capacity of the Cotaco soil is high. Permeability is moderate in the subsoil. Runoff is slow. Natural fertility is moderate. The seasonal high water table is about 1.5 to 2.5 feet below the

Figure 5.—Tobacco in an area of Chagrin silt loam.

surface. Where unlimed, this soil is extremely acid to strongly acid. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as cropland or hayland. A few areas are used for pasture, urban development, or woodland.

This soil is suited to cultivated crops and to hay and pasture. Crops can be grown year after year on this soil, but cover crops are needed to reduce the hazard of erosion. Crop residue management helps to maintain fertility and tilth. There is a risk of crop damage from flooding early in the growing season. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The hazard of flooding and the seasonal high water table limit most urban uses. They limit this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding and the seasonal high water table limit this soil as a site for local roads and streets. Raised fill above the flood level, a subsurface drainage system, and cross culverts or another system of surface water removal can minimize these limitations.

The hazard of flooding, a high shrink-swell potential, low soil strength, slow permeability, and a seasonal high water table limit use of the included soils for most kinds of urban development.

The capability subclass is IIw. The woodland ordination symbol is 4A.

CtB—Cotaco loam, 3 to 8 percent slopes

This soil is very deep, gently sloping, and moderately well drained. It is on low terraces along the major streams throughout the county. The soil is subject to rare flooding.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil extends to a depth of 39 inches. The upper 4 inches of the subsoil is yellowish brown loam. The next 5 inches is yellowish brown loam mottled with pale brown. The next 11 inches is brownish yellow clay loam mottled with light gray. The lower 11 inches is brownish yellow and light gray clay loam. The substratum extends to a depth of at least 65 inches. The upper 11 inches of the substratum is brownish yellow and light gray loam. The lower 15 inches is brownish yellow and light gray channery loam.

Small areas of the well drained Kanawha and Chagrin soils, the moderately well drained Markland soils, and the somewhat poorly drained Guyan soils are included with this soil in mapping. Also included are small areas of soils that are not subject to flooding, soils with a slope of less than 3 percent, and soils with a slope of more than 8 percent. Included soils make up about 20 percent of the unit.

The available water capacity of the Cotaco soil is high. Permeability is moderate in the subsoil. Runoff is medium. Natural fertility is moderate. The seasonal high water table is about 1.5 to 2.5 feet below the surface. Where unlimed, this soil is extremely acid to strongly acid. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as cropland or hayland. A few areas are used for pasture, urban development, or woodland.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is moderate in unprotected areas. If this soil is cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The hazard of flooding and the seasonal high water table limit most urban uses. They limit this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding and the seasonal high water table limit this soil as a site for local roads and streets. Raised fill above the flood level, a subsurface drainage system, and cross culverts or another system of surface water removal can minimize these limitations.

The hazard of flooding, a high shrink-swell potential, low soil strength, a seasonal high water table, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is IIe. The woodland ordination symbol is 4A.

DgF—Dekalb-Gilpin complex, 35 to 65 percent slopes, very stony

This complex consists of moderately deep, very steep, well drained soils on side slopes in the central part of the county. Stones cover 1 to 3 percent of the surface. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 50 percent Dekalb channery sandy loam, 20 percent Gilpin silt loam, and 30 percent other soils.

Typically, the surface layer of the Dekalb soil is very dark grayish brown channery sandy loam about 1 inch thick. The subsoil extends to a depth of 33 inches. The upper 3 inches of the subsoil is brown channery sandy loam. The next 9 inches is yellowish brown channery sandy loam. The lower 20 inches is yellowish brown very channery sandy loam. Fractured sandstone bedrock is at a depth of 33 inches.

Typically, the surface layer of the Gilpin soil is brown silt loam about 1 inch thick. The subsoil extends to a depth of 22 inches. The upper 5 inches of the subsoil is dark yellowish brown silt loam. The lower 16 inches is yellowish brown channery silty clay loam. Light olive brown, fractured shale and fine grained sandstone bedrock is at a depth of 22 inches.

Small areas of the well drained Pineville and Upshur soils and the moderately well drained Beech, Buchanan, Dormont, and Latham soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that are more than 40 inches deep over bedrock, soils that have lost most or all of their original surface layer, soils in areas where more than 3 percent of the surface is covered with stones, soils with a slope of less than 35 percent, soils with a slope of more than 65 percent, and bedrock escarpments.

The available water capacity is very low or low in the Dekalb soil and low or moderate in the Gilpin soil. Permeability in the subsoil is rapid in the Dekalb soil and moderate in the Gilpin soil. Runoff is very rapid on both soils. Natural fertility is low in the Dekalb soil and low or moderate in the Gilpin soil. Where unlimed, both soils are extremely acid to strongly acid. The depth to bedrock is 20 to 40 inches in both soils.

Nearly all areas of these soils are used as woodland. A few areas are used as pasture.

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. Slope and stones restrict the use of farm machinery. Management concerns are overgrazing and a severe hazard of erosion in unprotected areas. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

The Dekalb soil has moderate potential productivity for trees, and the Gilpin soil has moderately high potential productivity. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

These soils are poorly suited to most urban uses. The depth to bedrock and slope are severe limitations.

Low soil strength, a moderate or high shrink-swell potential, moderately slow or slow permeability, a seasonal high water table, slippage, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is VIIs. The woodland ordination symbol is 3R in areas of the Dekalb soil and 4R in areas of the Gilpin soil.

DlE—Dekalb-Latham complex, 25 to 35 percent slopes

This complex consists of moderately deep, steep, well drained and moderately well drained soils on narrow ridgetops in the central and southern parts of the county. The Latham soil is subject to slippage. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 45 percent Dekalb channery sandy loam, 30 percent Latham silt loam, and 25 percent other soils.

Typically, the surface layer of the Dekalb soil is very dark grayish brown channery sandy loam about 1 inch thick. The subsoil extends to a depth of 33 inches. The upper 3 inches of the subsoil is brown channery sandy loam. The next 9 inches is yellowish brown channery sandy loam. The lower 20 inches is yellowish brown very channery sandy loam. Fractured sandstone bedrock is at a depth of 33 inches.

Typically, the surface layer of the Latham soil is dark brown silt loam about 4 inches thick. The subsoil extends to a depth of 29 inches. The upper 3 inches of the subsoil is yellowish brown channery silt loam. The next 9 inches is yellowish brown channery silty clay loam. The next 7 inches is light yellowish brown channery silty clay mottled with light gray. The lower 6 inches is yellowish brown channery silty clay mottled with light gray. The substratum is yellowish brown channery silty clay mottled with light gray. It extends to gray, weathered shale bedrock at a depth of 34 inches.

Small areas of the well drained Gilpin and Upshur soils and the moderately well drained Dormont soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that are more than 40 inches deep over bedrock, soils that have lost most or all of their original surface layer, soils in areas where more than 1 percent of the surface is covered with stones, soils with a slope of less than 25 percent, soils with a slope of more than 35 percent, and bedrock escarpments.

The available water capacity is very low or low in the Dekalb soil and moderate or high in the Latham soil. Permeability in the subsoil is rapid in the Dekalb soil and slow in the Latham soil. Runoff is very rapid on both soils. Natural fertility is low in the Dekalb soil and moderate in the Latham soil. The Latham soil has a seasonal high water table about 1.5 to 3.0 feet below the surface. Where unlimed, the Dekalb soil is extremely acid to strongly acid and the Latham soil is extremely acid to strongly acid in the surface layer and extremely acid or very strongly acid in the subsoil and substratum. The depth to bedrock is 20 to 40 inches in both soils.

Most areas of these soils are used as woodland. A few areas are used as pasture.

These soils are not suited to cultivated crops or hay but are suited to pasture. Management concerns are overgrazing and a severe hazard of erosion in unprotected areas. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the Latham soil is reasonably firm.

These soils have moderate potential productivity for trees. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

These soils are poorly suited to most urban uses. The depth to bedrock and slope severely limit the Dekalb soil, and a high shrink-swell potential, low soil strength, the seasonal high water table, slippage, slope, and slow permeability severely limit the Latham soil.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, slippage, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is VIe. The woodland ordination symbol is 3R.

DPG—Dekalb-Pineville-Guyandotte association, very steep, extremely stony

This association consists of moderately deep and very deep, very steep, well drained soils on side slopes, on foot slopes, and in coves in the southern part of the county. Typically, the Dekalb soil is on ridgetops and convex, upper side slopes; the Pineville soil in on the lower side slopes and on foot slopes; and the Guyandotte soil is in north-facing coves and on the upper and middle, north-facing side slopes. Soils that are similar to the Guyandotte soil are in similar south-facing positions. Stones cover 3 to 15 percent of the surface. Areas of each soil are large enough to be mapped separately. Given the present and predicted uses, however, the three soils were mapped as one unit. Individual areas are about 40 percent Dekalb channery sandy loam, 25 percent Pineville channery loam, 20 percent Guyandotte channery loam, and 15 percent other soils and rock outcrop.

Typically, the surface layer of the Dekalb soil is very dark grayish brown channery sandy loam about 1 inch thick. The subsoil extends to a depth of 33 inches. The upper 3 inches of the subsoil is brown channery sandy loam. The next 9 inches is yellowish brown channery sandy loam. The lower 20 inches is yellowish brown very channery sandy loam. Fractured sandstone bedrock is at a depth of 33 inches.

Typically, the surface layer of the Pineville soil is dark brown channery loam about 5 inches thick. The subsoil is channery loam, which extends to a depth of 53 inches. The upper 9 inches of the subsoil is light yellowish brown. The next 14 inches is reddish yellow. The lower 25 inches is yellowish brown. The substratum is yellowish brown channery loam mottled with light gray. It extends to a depth of at least 65 inches.

Typically, the surface layer of the Guyandotte soil is very dark grayish brown and dark brown channery loam about 13 inches thick. The subsoil extends to a depth of 53 inches. The upper 8 inches of the subsoil is brown channery loam. The next 9 inches is dark yellowish brown very channery loam. The lower 23 inches is yellowish brown very channery loam. The substratum is yellowish brown extremely channery loam, which extends to a depth of at least 65 inches.

Small areas of the well drained Gilpin soils and the moderately well drained Buchanan, Dormont, and Latham soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that have silty textures, soils that have lost most or all of their original surface layer, soils in areas where less than 3 percent of the surface is covered with stones, soils with a slope of less than 35 percent, soils with a slope of more than 65 percent, and bedrock escarpments.

The available water capacity is very low or low in the Dekalb soil, moderate or high in the Pineville soil, and moderate in the Guyandotte soil. Permeability in the subsoil is rapid in the Dekalb soil, moderate in the Pineville soil, and moderate or moderately rapid in the Guyandotte soil. Runoff is very rapid on all three soils. Natural fertility is low in the Dekalb soil, low or moderate in the Pineville soil, and moderate or high in the Guyandotte soil. Where unlimed, the Dekalb soil is extremely acid to strongly acid, the Pineville soil is extremely acid to neutral in the surface layer and extremely acid to strongly acid in the subsoil and substratum, and the Guyandotte soil is very strongly acid to neutral in the surface layer and very strongly acid to moderately acid in the subsoil and substratum. The depth to bedrock is 20 to 40 inches in the Dekalb soil and more than 60 inches in the Pineville and Guyandotte soils.

Nearly all areas of these soils are used as woodland. A few areas are used as pasture.

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. Slope and stones restrict the use of farm machinery. Management concerns are overgrazing and a severe hazard of erosion in unprotected areas. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

The Dekalb soil has moderate potential productivity for trees, and the Pineville and Guyandotte soils have moderately high potential productivity. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

These soils are poorly suited to most urban uses. The depth to bedrock and slope severely limit the Dekalb soil, and slope severely limits the Pineville and Guyandotte soils.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, slippage, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is VIIs. The woodland ordination symbol is 3R in areas of the Dekalb soil and 5R in areas of the Pineville and Guyandotte soils.

DrD—Dormont-Latham complex, 15 to 25 percent slopes

This complex consists of moderately deep and deep, moderately steep, moderately well drained soils on benches and side slopes in the central and southern parts of the county. These soils are subject to slippage. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 45 percent Dormont silt loam, 35 percent Latham silt loam, and 20 percent other soils.

Typically, the surface layer of the Dormont soil is brown silt loam about 7 inches thick. The subsoil extends to a depth of 40 inches. The upper 4 inches of the subsoil is dark yellowish brown silt loam. The next 12 inches is strong brown silty clay loam. The lower 17 inches is strong brown channery silty clay loam mottled with light gray. The substratum is strong brown very channery silty clay loam mottled with light gray. It extends to weathered siltstone bedrock at a depth of 54 inches.

Typically, the surface layer of the Latham soil is dark brown silt loam about 4 inches thick. The subsoil extends to a depth of 29 inches. The upper 3 inches of the subsoil is yellowish brown channery silt loam. The next 9 inches is yellowish brown channery silty clay loam. The next 7 inches is light yellowish brown channery silty clay mottled with light gray. The lower 6 inches is yellowish brown channery silty clay mottled with light gray. The substratum is yellowish brown channery silty clay mottled with light gray. It extends to gray, weathered shale bedrock at a depth of 34 inches.

Small areas of the well drained Dekalb, Gilpin, Pineville, and Upshur soils and the moderately well drained Beech soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that have a limy subsoil, soils that have lost most or all of their original surface layer, soils in areas where 1 to 3 percent of the surface is covered with stones, soils with a slope of less than 15 percent, and soils with a slope of more than 25 percent.

The available water capacity is moderate or high in the Dormont and Latham soils. Permeability in the subsoil is slow or moderate in the Dormont soil and slow in the Latham soil. Runoff is rapid on both soils. Natural fertility is moderate in both soils. Both soils have a seasonal high water table about 1.5 to 3.0 feet below the surface. Where unlimed, the Dormont soil is very strongly acid to moderately acid and the Latham soil is extremely acid to strongly acid in the surface layer and extremely acid or very strongly acid in the subsoil and substratum. The depth to bedrock is 48 to 60 inches in the Dormont soil and 20 to 40 inches in the Latham soil.

Most areas of these soils are used as woodland. A few areas are used as hayland or pasture.

These soils are not suited to cultivated crops or hay but are suited to pasture. The hazard of erosion is severe in unprotected areas. If these soils are cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, grassed waterways, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soils are reasonably firm.

In areas of the Dormont soil, the potential productivity for trees is moderately high on north-facing slopes and moderate on south-facing slopes. The Latham soil has moderate potential productivity. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

A high shrink-swell potential, low soil strength, the seasonal high water table, slippage, and slope limit most urban uses.

These soils are limited as sites for dwellings with basements because of the seasonal high water table, slippage, and slope. Installing foundation drains, sealing foundations, and backfilling with porous material can minimize the limitation caused by the seasonal high water table. Avoiding unnecessary disturbance of the soils can minimize the hazard of slippage. Land shaping and grading can minimize the limitation caused by slope. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction can reduce the hazards of erosion and slippage. Designing dwellings that conform to the natural slope and setting can keep land shaping, and ultimately erosion, to a minimum.

These soils are limited as sites for septic tank absorption fields because of the seasonal high water table, slippage, and slope. These limitations can be minimized by installing specially designed absorption fields.

These soils are limited as sites for local roads and streets. Low soil strength, slippage, and slope limit the Dormont soil, and a high shrink-swell potential, low soil strength, and slope limit the Latham soil. Constructing the roads and streets on the contour and on suitable subgrade can minimize the limitations caused by the high shrink-swell potential, low soil strength, and slope. Avoiding unnecessary disturbance of the soil can minimize the hazard of slippage.

The depth to bedrock, low soil strength, a moderate or high shrink-swell potential, moderately slow or slow permeability, a seasonal high water table, slippage, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is IVe. The woodland ordination symbol is 4R in areas of the Dormont soil and 3R in areas of the Latham soil.

DrE—Dormont-Latham complex, 25 to 35 percent slopes

This complex consists of moderately deep and deep, steep, moderately well drained soils on benches and side slopes in the central and southern parts of the county. These soils are subject to slippage. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 50 percent Dormont silt loam, 25 percent Latham silt loam, and 25 percent other soils.

Typically, the surface layer of the Dormont soil is brown silt loam about 7 inches thick. The subsoil extends to a depth of 40 inches. The upper 4 inches of the subsoil is dark yellowish brown silt loam. The next 12 inches is strong brown silty clay loam. The lower 17 inches is strong brown channery silty clay loam mottled with light gray. The substratum is strong brown very channery silty clay loam mottled with light gray. It extends to weathered siltstone bedrock at a depth of 54 inches.

Typically, the surface layer of the Latham soil is dark brown silt loam about 4 inches thick. The subsoil extends to a depth of 29 inches. The upper 3 inches of the subsoil is yellowish brown channery silt loam. The next 9 inches is yellowish brown channery silty clay loam. The next 7 inches is light yellowish brown channery silty clay mottled with light gray. The lower 6 inches is yellowish brown channery silty clay mottled with light gray. The substratum is yellowish brown channery silty clay mottled with light gray. It extends to gray, weathered shale bedrock at a depth of 34 inches.

Small areas of the well drained Dekalb, Gilpin, Pineville, and Upshur soils and the moderately well drained Beech soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that have a limy subsoil, soils that have lost most or all of their original surface layer, soils in areas where 1 to 3 percent of the surface is covered with stones, soils with a slope of less than 25 percent, and soils with a slope of more than 35 percent.

The available water capacity is moderate or high in the Dormont and Latham soils. Permeability in the subsoil is slow or moderate in the Dormont soil and slow in the Latham soil. Runoff is very rapid on both soils. Natural fertility is moderate in both soils. Both soils have a seasonal high water table about 1.5 to 3.0 feet below the surface. Where unlimed, the Dormont soil is very strongly acid to moderately acid and the Latham soil is extremely acid to strongly acid in the surface layer and extremely acid or very strongly acid in the subsoil and substratum. The depth to bedrock is 48 to 60 inches in the Dormont soil and 20 to 40 inches in the Latham soil.

Most areas of these soils are used as woodland. A few areas are used as pasture.

These soils are not suited to cultivated crops or hay but are suited to pasture. Management concerns are overgrazing and a severe hazard of erosion in unprotected areas. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soils are reasonably firm.

The potential productivity for trees on the Dormont soil is moderately high on north-facing slopes and moderate on south-facing slopes. The Latham soil has moderate potential productivity. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

These soils are poorly suited to most urban uses. Low soil strength, the seasonal high water table, slippage, and slope severely limit the Dormont soil, and a high shrink-swell potential, low soil strength, the seasonal high water table, slippage, and slope severely limit the Latham soil.

The depth to bedrock, low soil strength, a moderate or high shrink-swell potential, moderately slow or slow permeability, a seasonal high water table, slippage, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is VIe. The woodland ordination symbol is 4R in areas of the Dormont soil and 3R in areas of the Latham soil.

FvF—Fiveblock channery sandy loam, very steep, very stony

This soil is very deep, very steep, and somewhat excessively drained. It is on benches and side slopes in the central and southern parts of the county. It is in areas where coal was surface mined. Stones cover 1 to 3 percent of the surface. Slope ranges from 35 to 65 percent.

Typically, the surface layer is yellowish brown channery sandy loam mottled with brownish yellow and grayish brown. It is about 9 inches thick. The substratum extends to a depth of at least 65 inches. The upper 14 inches of the substratum is dark yellowish brown very channery sandy loam mottled with light yellowish brown, yellowish brown, and black. The lower 42 inches is brown very channery sandy loam mottled with yellowish brown.

Small areas of the well drained Dekalb, Gilpin, Guyandotte, and Pineville soils and the moderately well drained Buchanan, Dormont, and Latham soils are included with this soil in mapping. Also included are small areas of soils that have more than 80 percent rock fragments, soils with a slope of less than 35 percent, soils with a slope of more than 65 percent, and soils with an acid substratum.

The available water capacity of the Fiveblock soil is low or moderate. Permeability is moderately rapid or rapid throughout the profile. Runoff is very rapid. Natural fertility is moderate or high. Where unlimed, this soil is moderately acid to mildly alkaline. The depth to bedrock is more than 60 inches.

Most areas of this soil have been seeded to grasses and legumes. Most will be allowed to revert to woodland.

This soil is not suited to cultivated crops or hay and is difficult to manage for pasture. Slope and stones restrict the use of farm machinery. The less sloping areas on benches are poorly suited to pasture. Management concerns are overgrazing and a severe hazard of erosion in unprotected areas. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees, although most areas are not forested at this time. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

This soil is poorly suited to most urban uses. Slope is a severe limitation.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is VIIs. The woodland ordination symbol is 4R.

GuC—Gilpin-Upshur complex, 8 to 15 percent slopes

This complex consists of moderately deep and deep, strongly sloping, well drained soils on ridgetops and benches in the northern and central parts of the county. These soils are moderately eroded or severely eroded. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 50 percent Gilpin silt loam, 30 percent Upshur silt loam, and 20 percent other soils.

Typically, the surface layer of the Gilpin soil is brown silt loam about 1 inch thick. The subsoil extends to a depth of 22 inches. The upper 5 inches of the subsoil is dark yellowish brown silt loam. The lower 16 inches is yellowish brown channery silty clay loam. Light olive brown, fractured shale and fine grained sandstone bedrock is at a depth of 22 inches.

Typically, the surface layer of the Upshur soil is brown silt loam about 4 inches thick. The subsoil extends to a depth of 40 inches. The upper 4 inches of the subsoil is brown silt loam. The next 10 inches is reddish brown clay. The next 10 inches is dark reddish brown channery clay. The lower 12 inches is weak red channery clay. The substratum is dusky red very channery clay, which extends to weathered shale bedrock at a depth of 45 inches.

Small areas of the well drained Dekalb soils and the moderately well drained Dormont and Latham soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that are similar to the Upshur soil but are less than 40 inches deep over bedrock, soils that have lost most or all of their original surface layer, and soils with a slope of more than 15 percent.

The available water capacity is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability in the subsoil is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is rapid on both soils. Natural fertility is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Where unlimed, the Gilpin soil is extremely acid to strongly acid and the Upshur soil is very strongly acid to slightly acid in the surface layer, very strongly acid to moderately acid in the subsoil, and strongly acid to moderately alkaline in the substratum. The depth to bedrock is 20 to 40 inches in the Gilpin soil and 40 to 60 inches in the Upshur soil. The Upshur soil has a high shrink-swell potential in the subsoil and is highly susceptible to land slips.

Most areas of these soils are used as hayland, pasture, or cropland. A few areas are used for urban development or woodland.

These soils are suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas. If these soils are cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the Upshur soil is reasonably firm.

The Gilpin soil has moderately high potential productivity for trees, and the Upshur soil has moderate potential productivity. The hazard of erosion, equipment limitations, and plant competition are management concerns.

The depth to bedrock, a high shrink-swell potential, low soil strength, slope, and slow permeability limit most urban uses.

These soils are limited as sites for dwellings with basements. The depth to bedrock and slope limit the Gilpin soil, and a high shrink-swell potential limits the Upshur soil. Excavation costs are higher because of the depth to bedrock. Land shaping and grading can minimize the limitation caused by slope. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction can reduce the hazard of erosion. Designing dwellings that conform to the natural slope and setting can keep land shaping, and ultimately erosion, to a minimum. Building foundations on stable soil or bedrock, using extra reinforcement in footers, backfilling with porous material, and installing a properly designed subsurface drainage system reduce ground-water flow and the amount of moisture under the foundation and thus minimize the limitation caused by the shrink-swell potential.

These soils are limited as sites for septic tank absorption fields. The depth to bedrock limits the Gilpin soil, and slow permeability limits the Upshur soil. These limitations can be minimized by installing specially designed absorption fields.

These soils are limited as sites for local roads and streets. Slope limits the Gilpin soil, and a high shrink-swell potential and low soil strength limit the Upshur soil. Constructing the roads and streets on the contour and on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, slippage, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is IIIe. The woodland ordination symbol is 4A in areas of the Gilpin soil and 3C in areas of the Upshur soil.

GuD—Gilpin-Upshur complex, 15 to 25 percent slopes

This complex consists of moderately deep and deep, moderately steep, well drained soils on ridgetops and benches in the northern and central parts of the county. The Upshur soil is subject to slippage. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 50 percent Gilpin silt loam, 25 percent Upshur silt loam, and 25 percent other soils.

Typically, the surface layer of the Gilpin soil is brown silt loam about 1 inch thick. The subsoil extends to a depth of 22 inches. The upper 5 inches of the subsoil is dark yellowish brown silt loam. The lower 16 inches is yellowish brown channery silty clay loam. Light olive brown, fractured shale and fine grained sandstone bedrock is at a depth of 22 inches.

Typically, the surface layer of the Upshur soil is brown silt loam about 4 inches thick. The subsoil extends to a depth of 40 inches. The upper 4 inches of the subsoil is brown silt loam. The next 10 inches is reddish brown clay. The next 10 inches is dark reddish brown channery clay. The lower 12 inches is weak red channery clay. The substratum is dusky red very channery clay, which extends to weathered shale bedrock at a depth of 45 inches.

Small areas of the well drained Dekalb soils and the moderately well drained Dormont and Latham soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that are similar to the Upshur soil but are less than 40 inches deep over bedrock, soils that have lost most or all of their original surface layer, soils with a slope of less than 15 percent, and soils with a slope of more than 25 percent.

The available water capacity is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability in the subsoil is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is rapid on both soils. Natural fertility is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Where unlimed, the Gilpin soil is extremely acid to strongly acid and the Upshur soil is very strongly acid to slightly acid in the surface layer, very strongly acid to moderately acid in the subsoil, and strongly acid to moderately alkaline in the substratum. The depth to bedrock is 20 to 40 inches in the Gilpin soil and 40 to 60 inches in the Upshur soil. The Upshur soil has a high shrink-swell potential in the subsoil and is highly susceptible to land slips.

Most areas of these soils are used as hayland or pasture. About one-third of the areas are used as woodland. A few areas are used for urban development.

These soils have limited suitability for cultivated crops and are better suited to hay and pasture. The hazard of erosion is severe in unprotected areas. If these soils are cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, grassed waterways, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the Upshur soil is reasonably firm.

These soils have moderately high potential productivity for trees on north-facing slopes and moderate potential productivity on south-facing slopes. The hazard of erosion, equipment limitations, and plant competition are management concerns.

The depth to bedrock, a high shrink-swell potential, low soil strength, slippage, slope, and slow permeability limit most urban uses.

These soils are limited as sites for dwellings with basements. Slope limits the Gilpin soil, and a high shrink-swell potential, slippage, and slope limit the Upshur soil. Land shaping and grading can minimize the limitation caused by slope. Avoiding unnecessary disturbance of the soil can minimize the hazard of slippage. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction can reduce the hazards of erosion and slippage. Designing dwellings that conform to the natural slope and setting can keep land shaping, and ultimately erosion, to a minimum. Building foundations on stable soil or bedrock, using extra reinforcement in footers, backfilling with porous material, and installing a properly designed subsurface drainage system reduce ground-water flow and the amount of moisture under the foundation and thus minimize the limitation caused by the shrink-swell potential.

These soils are limited as sites for septic tank absorption fields. The depth to bedrock and slope limit the Gilpin soil, and slippage, slope, and slow permeability limit the Upshur soil. These limitations can be minimized by installing specially designed absorption fields.

These soils are limited as sites for local roads and streets. Slope limits the Gilpin soil, and a high shrink-swell potential, low soil strength, and slope limit the Upshur soil. Constructing the roads and streets on the contour and on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, slippage, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is IVe. The woodland ordination symbol is 4R.

GuE—Gilpin-Upshur complex, 25 to 35 percent slopes

This complex consists of moderately deep and deep, steep, well drained soils on side slopes in the northern part of the county and narrow ridgetops in the northern and central parts. In many areas the landscape is characterized by a bench-and-break topography, which consists of a series of narrow, less sloping contour benches separated by short, steeper side slopes, or breaks. The Upshur soil is subject to slippage. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 50 percent Gilpin silt loam, 25 percent Upshur silt loam, and 25 percent other soils.

Typically, the surface layer of the Gilpin soil is brown silt loam about 1 inch thick. The subsoil extends to a depth of 22 inches. The upper 5 inches of the subsoil is dark yellowish brown silt loam. The lower 16 inches is yellowish brown channery silty clay loam. Light olive brown, fractured shale and fine grained sandstone bedrock is at a depth of 22 inches.

Typically, the surface layer of the Upshur soil is brown silt loam about 4 inches thick. The subsoil extends to a depth of 40 inches. The upper 4 inches of the subsoil is brown silt loam. The next 10 inches is reddish brown clay. The next 10 inches is dark reddish brown channery clay. The lower 12 inches is weak red channery clay. The substratum is dusky red very channery clay, which extends to weathered shale bedrock at a depth of 45 inches.

Small areas of the well drained Dekalb soils and the moderately well drained Beech, Dormont, and Latham soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that are similar to the Upshur soil but are less than 40 inches deep over bedrock, soils that have lost most or all of their original surface layer, soils with a slope of less than 25 percent, and soils with a slope of more than 35 percent.

The available water capacity is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability in the subsoil is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is very rapid on both soils. Natural fertility is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Where unlimed, the Gilpin soil is extremely acid to strongly acid and the Upshur soil is very strongly acid to slightly acid in the surface layer, very strongly acid to moderately acid in the subsoil, and strongly acid to moderately alkaline in the substratum. The depth to bedrock is 20 to 40 inches in the Gilpin soil and 40 to 60 inches in the Upshur soil. The Upshur soil has a high shrink-swell potential in the subsoil and is highly susceptible to land slips.

Most areas of these soils are used as woodland. About one-third of the areas are used as pasture.

These soils are not suited to cultivated crops or hay but are suited to pasture. Management concerns are overgrazing and a severe hazard of erosion in unprotected areas. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the Upshur soil is reasonably firm.

These soils have moderately high potential productivity for trees on north-facing slopes and moderate potential productivity on south-facing slopes. The hazard of erosion, equipment limitations, and plant competition are management concerns.

These soils are poorly suited to most urban uses. The depth to bedrock and slope severely limit the Gilpin soil, and a high shrink-swell potential, low soil strength, slippage, slope, and slow permeability severely limit the Upshur soil.

The depth to bedrock, low soil strength, a moderate or high shrink-swell potential, a seasonal high water table, slippage, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is VIe. The woodland ordination symbol is 4R.

GuF—Gilpin-Upshur complex, 35 to 65 percent slopes

This complex consists of moderately deep and deep, very steep, well drained soils on side slopes in the northern part of the county. In many areas the landscape is characterized by a bench-and-break topography, which consists of a series of narrow, less sloping contour benches separated by short, steeper side slopes, or breaks. The Upshur soil is subject to slippage. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 50 percent Gilpin silt loam, 20 percent Upshur silt loam, and 30 percent other soils.

Typically, the surface layer of the Gilpin soil is brown silt loam about 1 inch thick. The subsoil extends to a depth of 22 inches. The upper 5 inches of the subsoil is dark yellowish brown silt loam. The lower 16 inches is yellowish brown channery silty clay loam. Light olive brown, fractured shale and fine grained sandstone bedrock is at a depth of 22 inches.

Typically, the surface layer of the Upshur soil is brown silt loam about 4 inches thick. The subsoil extends to a depth of 40 inches. The upper 4 inches of the subsoil is brown silt loam. The next 10 inches is reddish brown clay. The next 10 inches is dark reddish brown channery clay. The lower 12 inches is weak red channery clay. The substratum is dusky red very channery clay, which extends to weathered shale bedrock at a depth of 45 inches.

Small areas of the well drained Dekalb soils and the moderately well drained Beech, Dormont, and Latham soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that are similar to the Upshur soil but are less than 40 inches deep over bedrock, soils that have lost most or all of their original surface layer, soils in areas where more than 1 percent of the surface is covered with stones, soils with a slope of less than 35 percent, soils with a slope of more than 65 percent, and bedrock escarpments.

The available water capacity is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability in the subsoil is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is very rapid on both soils. Natural fertility is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Where unlimed, the Gilpin soil is extremely acid to strongly acid and the Upshur soil is very strongly acid to slightly acid in the surface layer, very strongly acid to moderately acid in the subsoil, and strongly acid to moderately alkaline in the substratum. The depth to bedrock is 20 to 40 inches in the Gilpin soil and 40 to 60 inches in the Upshur soil. The Upshur soil has a high shrink-swell potential in the subsoil and is highly susceptible to land slips.

Most areas of these soils are used as woodland. A few areas are used as pasture.

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. Slope restricts the use of farm machinery. Management concerns are overgrazing and a severe hazard of erosion in unprotected areas. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the Upshur soil is reasonably firm.

These soils have moderately high potential productivity for trees on north-facing slopes and moderate potential productivity on south-facing slopes. The hazard of erosion, equipment limitations, and plant competition are management concerns.

These soils are poorly suited to most urban uses. The depth to bedrock and slope severely limit the Gilpin soil, and a high shrink-swell potential, low soil strength, slippage, slope, and slow permeability severely limit the Upshur soil.

The depth to bedrock, low soil strength, a moderate or high shrink-swell potential, a seasonal high water table, slippage, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is VIIe. The woodland ordination symbol is 4R.

Gw—Grigsby loam

This soil is very deep, nearly level, and well drained. It is on flood plains along Twelvepole Creek and smaller streams throughout the central and southern parts of the county. The soil is subject to occasional flooding during winter and early spring. Slope ranges from 0 to 3 percent.

Typically, the surface layer is brown loam about 12 inches thick. The upper 7 inches of the surface layer is brown loam. The lower 5 inches is brown sandy loam. The subsoil is sandy loam, which extends to a depth of 42 inches. The upper 8 inches of the subsoil is brownish yellow. The lower 22 inches is yellowish brown. The substratum is yellowish brown sandy loam, which extends to a depth of at least 65 inches.

Small areas of the well drained Chagrin and Kanawha soils and the moderately well drained Cotaco and Lobdell soils are included with this soil in mapping. Also included are small areas of soils with a slope of more than 3 percent, soils that are subject to frequent flooding, and soils that are subject to rare flooding. Included soils make up about 20 percent of the unit.

The available water capacity of the Grigsby soil is moderate or high. Permeability is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. Runoff is slow. Natural fertility is high. Where unlimed, this soil is moderately acid to neutral in the solum and strongly acid to neutral in the substratum. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as cropland, hayland, or pasture (fig. 6). A few areas are used as woodland.

This soil is well suited to cultivated crops and to hay and pasture. Crops can be grown year after year on this soil, but cover crops are needed to reduce the hazard of erosion. Crop residue management helps to maintain fertility and tilth. There is a risk of crop damage from flooding early in the growing season. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The hazard of flooding limits most urban uses. It severely limits this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding limits this soil as a site for local roads and streets. Raised fill above the flood level and cross culverts or another system of surface water removal can minimize this limitation.

The hazard of flooding, low soil strength, and a seasonal high water table limit use of the included soils for most kinds of urban development.

The capability subclass is IIw. The woodland ordination symbol is 5A.

Gy—Guyan silt loam

This soil is very deep, nearly level, and somewhat poorly drained. It is on low terraces along the major streams in the northern and central parts of the county. The soil is subject to rare flooding. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown silt loam about 4 inches thick. The subsoil extends to a depth of 57 inches. The upper 6 inches of the subsoil is light olive brown silt loam mottled with dark brown. The next 7 inches is light yellowish brown silt loam mottled with brownish yellow and light gray. The next 14 inches is light gray clay loam mottled with yellowish brown and light yellowish brown. The next 13 inches is light brownish gray clay loam mottled with yellowish brown and light yellowish brown. The lower 13 inches is light brownish gray silty clay loam mottled with yellowish brown. The substratum is light brownish gray silty clay loam mottled with yellowish brown and light gray. It extends to a depth of at least 65 inches.

Small areas of the well drained Kanawha soils, the moderately well drained Cotaco, Lobdell, and Markland soils, and the poorly drained Melvin soils are

Figure 6.—Pasture in an area of Grigsby loam.

included with this soil in mapping. Also included are small areas of soils that are subject to rare flooding and soils with a slope of more than 3 percent. Included soils make up about 20 percent of the unit.

The available water capacity of the Guyan soil is high. Permeability is moderate in the subsoil. Runoff is slow. Natural fertility is moderate. The seasonal high water table is about 0.5 foot to 1.5 feet below the surface. Where unlimed, this soil is very strongly acid to neutral in the upper part of the solum and very strongly acid or strongly acid in the lower part of the solum and in the substratum. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as cropland, hayland, or pasture. A few areas are used as woodland.

This soil is suited to cultivated crops but is better suited to water-tolerant hay or pasture plants. Crops can be grown year after year in areas that have been drained, but cover crops are needed to reduce the hazard of erosion. The major pasture management needs are rotational grazing; selection of water-tolerant pasture plants; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has high potential productivity for trees. Equipment limitations, seedling mortality, and plant competition are management concerns.

Low soil strength and the seasonal high water table limit most urban uses.

The seasonal high water table limits this soil as a site for dwellings with basements. Installing foundation drains, sealing foundations, and backfilling with porous material can minimize this limitation.

The seasonal high water table limits this soil as a site for septic tank absorption fields. This limitation can be minimized by installing specially designed absorption fields.

Low soil strength and the seasonal high water table limit this soil as a site for local roads and streets. Constructing the roads and streets on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The hazard of flooding, a high shrink-swell potential, low soil strength, a seasonal high water table, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is IIIw. The woodland ordination symbol is 4W.

Hu—Huntington silt loam

This soil is very deep, nearly level, and well drained. It is on flood plains along the Big Sandy River. Typically, the surface layer consists of soil material that has a high content of small coal particles. The soil is frequently flooded during winter and early spring. It may remain flooded for extended periods because of backwater flooding of the Ohio River. Slope ranges from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown silt loam about 17 inches thick. The subsoil extends to a depth of 40 inches. The upper 7 inches of the subsoil is brown silt loam. The next 8 inches is dark yellowish brown silt loam mottled with yellowish red. The lower 8 inches is dark yellowish brown fine sandy loam mottled with brown and red. The substratum extends to a depth of at least 65 inches. The upper 6 inches of the substratum is dark yellowish brown fine sandy loam. The lower 19 inches is brown and grayish brown, stratified sandy loam and silt loam.

Small areas of the well drained Ashton, Chagrin, Grigsby, and Kanawha soils and the moderately well drained Lindside and Lobdell soils are included with this soil in mapping. Also included are small areas of the poorly drained Melvin soils, soils with a surface layer of sandy loam, soils with a slope of more than 3 percent, soils that are subject to occasional flooding, and escarpments. Included soils make up about 20 percent of the unit.

The available water capacity of the Huntington soil is high. Permeability is moderate in the subsoil. Runoff is slow. Natural fertility is high. Where unlimed, this soil is moderately acid to mildly alkaline. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as cropland. A few areas are used as hayland, pasture, or woodland.

This soil is suited to cultivated crops and to hay and pasture. Crops can be grown year after year on this soil, but cover crops are needed to reduce the hazard of erosion. Crop residue management helps to maintain fertility and tilth. There is a risk of crop damage from flooding early in the growing season. Ponding by floodwater on this soil during winter and early spring may limit early-season hay and pasture production because of silt deposition on dormant grasses. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The hazard of flooding limits most urban uses. It severely limits this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding limits this soil as a site for local roads and streets. Raised fill above the flood level and cross culverts or another system of surface water removal can minimize this limitation.

The hazard of flooding, low soil strength, and a seasonal high water table limit use of the included soils for most kinds of urban development.

The capability subclass is IIw. The woodland ordination symbol is 5A.

KaA—Kanawha loam, 0 to 3 percent slopes

This soil is very deep, nearly level, and well drained. It is on high flood plains and low terraces along the Big Sandy River, the Tug Fork of the Big Sandy River, and other major streams in the northern and central parts of the county. The soil is subject to rare flooding in unprotected areas.

Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil extends to a depth of 47 inches. The upper 16 inches of the subsoil is strong brown clay loam. The next 15 inches is yellowish brown clay loam. The lower 7 inches yellowish brown sandy loam. The substratum is yellowish brown and strong brown, stratified loamy sand and sandy loam. It extends to a depth of at least 65 inches.

Small areas of the well drained Chagrin, Grigsby, and Nelse soils, the moderately well drained Cotaco, Lobdell, and Markland soils, and the somewhat poorly drained Guyan soils are included with this soil in mapping. Also included are small areas of soils with a subsoil that is more shallow than that in the Kanawha soil, soils with a subsoil of loamy sand, soils that are not subject to flooding, and soils with a slope of more than 3 percent. Included soils make up about 20 percent of the unit.

The available water capacity of the Kanawha soil is high. Permeability is moderate in the subsoil and moderate or moderately rapid in the substratum. Runoff is slow. Natural fertility is high. Where unlimed, this soil is strongly acid or moderately acid in the upper part of the solum and moderately acid or slightly acid in the lower part of the solum and in the substratum. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as cropland or hayland. A few areas are used for pasture, urban development, or woodland.

This soil is well suited to cultivated crops and to hay and pasture. Crops can be grown year after year on this soil, but cover crops are needed to reduce the hazard of erosion. Crop residue management helps to maintain fertility and tilth. There is a risk of crop damage from flooding early in the growing season. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The hazard of flooding and low soil strength limit most urban uses.

The hazard of flooding limits this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding and low soil strength limit this soil as a site for local roads and streets. Raised fill of suitable subgrade above the flood level and cross culverts or another system of surface water removal can minimize these limitations.

The hazard of flooding, a high shrink-swell potential, low soil strength, a seasonal high water table, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability class is I. The woodland ordination symbol is 4A.

KaB—Kanawha loam, 3 to 8 percent slopes

This soil is very deep, gently sloping, and well drained. It is on high flood plains and low terraces along the Big Sandy River, the Tug Fork of the Big Sandy River, and other major streams in the northern and central parts of the county. The soil is subject to rare flooding in unprotected areas.

Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil extends to a depth of 47 inches. The upper 16 inches of the subsoil is strong brown clay loam. The next 15 inches is yellowish brown clay loam. The lower 7 inches is yellowish brown sandy loam. The substratum is yellowish brown and strong brown, stratified loamy sand and sandy loam. It extends to a depth of at least 65 inches.

Small areas of the well drained Chagrin, Grigsby, and Nelse soils, the moderately well drained Cotaco, Lobdell, and Markland soils, and the somewhat poorly drained Guyan soils are included with this soil in mapping. Also included are small areas of soils with a subsoil that is more shallow than that in the Kanawha soil, soils with a subsoil of loamy sand, soils that are not subject to flooding, soils with a slope of less than 3 percent, and soils with a slope of more than 8 percent. Included soils make up about 20 percent of the unit.

The available water capacity of the Kanawha soil is high. Permeability is moderate in the subsoil and moderate or moderately rapid in the substratum. Runoff is medium. Natural fertility is high. Where unlimed, this soil is strongly acid or moderately acid in the upper part of the solum and moderately acid or slightly acid in the lower part of the solum and in the substratum. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as hayland or cropland. A few areas are used for pasture, urban development, or woodland.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is moderate in unprotected areas. If this soil is cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The hazard of flooding and low soil strength limit most urban uses.

The hazard of flooding limits this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding and low soil strength limit this soil as a site for local roads and streets. Raised fill of suitable subgrade above the flood level and cross culverts or another system of surface water removal can minimize these limitations.

The hazard of flooding, a high shrink-swell potential, low soil strength, a seasonal high water table, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is IIe. The woodland ordination symbol is 4A.

LgC—Latham-Gilpin complex, 8 to 15 percent slopes

This complex consists of moderately deep, strongly sloping, moderately well drained and well drained soils on ridgetops and benches in the central and southern parts of the county. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 55 percent Latham silt loam, 30 percent Gilpin silt loam, and 15 percent other soils.

Typically, the surface layer of the Latham soil is dark brown silt loam about 4 inches thick. The subsoil extends to a depth of 29 inches. The upper 3 inches of the subsoil is yellowish brown channery silt loam. The next 9 inches is yellowish brown channery silty clay loam. The next 7 inches is light yellowish brown channery silty clay mottled with light gray. The lower 6 inches is yellowish brown channery silty clay mottled with light gray. The substratum is yellowish brown channery silty clay mottled with light gray. It extends to gray, weathered shale bedrock at a depth of 34 inches.

Typically, the surface layer of the Gilpin soil is brown silt loam about 1 inch thick. The subsoil extends to a depth of 22 inches. The upper 5 inches of the subsoil is dark yellowish brown silt loam. The lower 16 inches is yellowish brown channery silty clay loam. Light olive brown, fractured shale and fine grained sandstone bedrock is at a depth of 22 inches.

Small areas of the well drained Dekalb and Upshur soils and the moderately well drained Dormont soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that have a limy subsoil, soils that have lost most or all of their original surface layer because of erosion, soils with a slope of less than 8 percent, and soils with a slope of more than 15 percent.

The available water capacity is moderate or high in the Latham soil and low or moderate in the Gilpin soil. Permeability in the subsoil is slow in the Latham soil and moderate in the Gilpin soil. Runoff is rapid on both soils. Natural fertility is moderate in the Latham soil and low or moderate in the Gilpin soil. The Latham soil has a seasonal high water table about 1.5 to 3.0 feet below the surface. Where unlimed, the Latham soil is extremely acid to strongly acid in the surface layer and extremely acid or very strongly acid in the subsoil and substratum and the Gilpin soil is extremely acid to strongly acid. The depth to bedrock is 20 to 40 inches in both soils.

About half of the areas of these soils are used as hayland, pasture, or cropland. A few areas are used for urban development. The remaining acreage is used as woodland.

These soils have limited suitability for cultivated crops and are better suited to hay or pasture. The hazard of erosion is severe in unprotected areas. If these soils are cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the Latham soil is reasonably firm.

The Latham soil has moderate potential productivity for trees, and the Gilpin soil has moderately high potential productivity. Equipment limitations, seedling mortality, and plant competition are management concerns.

The depth to bedrock, a high shrink-swell potential, low soil strength, the seasonal high water table, slope, and slow permeability limit most urban uses.

These soils are limited as sites for dwellings with basements. The seasonal high water table limits the Latham soil, and slope limits the Gilpin soil. Installing foundation drains, sealing foundation walls, diverting surface water from higher areas away from homesites, and backfilling with porous material can minimize the limitation caused by the seasonal high water table. Land shaping and grading can minimize the limitation caused by slope. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction can reduce the hazard of erosion. Designing dwellings that conform to the natural slope and setting can keep land shaping, and ultimately erosion, to a minimum.

These soils are limited as sites for septic tank absorption fields. The depth to bedrock, the seasonal high water table, and slow permeability limit the Latham soil, and the depth to bedrock limits the Gilpin soil. These limitations can be minimized by installing specially designed absorption fields.

These soils are limited as sites for local roads and streets. The high shrink-swell potential and low soil strength limit the Latham soil, and slope limits the

Gilpin soil. Constructing the roads and streets on the contour and on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is IVe. The woodland ordination symbol is 3C in areas of the Latham soil and 4A in areas of the Gilpin soil.

LgD—Latham-Gilpin complex, 15 to 25 percent slopes

This complex consists of moderately deep, moderately steep, moderately well drained and well drained soils on ridgetops and benches in the central and southern parts of the county. The Latham soil is subject to slippage. The two soils occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 50 percent Latham silt loam, 30 percent Gilpin silt loam, and 20 percent other soils.

Typically, the surface layer of the Latham soil is dark brown silt loam about 4 inches thick. The subsoil extends to a depth of 29 inches. The upper 3 inches of the subsoil is yellowish brown channery silt loam. The next 9 inches is yellowish brown channery silty clay loam. The next 7 inches is light yellowish brown channery silty clay mottled with light gray. The lower 6 inches is yellowish brown channery silty clay mottled with light gray. The substratum is yellowish brown channery silty clay mottled with light gray. It extends to gray, weathered shale bedrock at a depth of 34 inches.

Typically, the surface layer of the Gilpin soil is brown silt loam about 1 inch thick. The subsoil extends to a depth of 22 inches. The upper part of the subsoil is dark yellowish brown silt loam, and the lower part is yellowish brown channery silty clay loam mottled with light yellowish brown. Light olive brown, fractured shale and fine grained sandstone bedrock is at a depth of 22 inches.

Small areas of the well drained Dekalb and Upshur soils and the moderately well drained Dormont soils are included with these soils in mapping. Also included are small areas of soils that are less than 20 inches deep over bedrock, soils that have a limy subsoil, soils that have lost most or all of their original surface layer because of erosion, soils with a slope of less than 15 percent, and soils with a slope of more than 25 percent.

The available water capacity is moderate or high in the Latham soil and low or moderate in the Gilpin soil. Permeability in the subsoil is slow in the Latham soil and moderate in the Gilpin soil. Runoff is rapid on both soils. Natural fertility is moderate in the Latham soil and low or moderate in the Gilpin soil. The Latham soil has a seasonal high water table about 1.5 to 3.0 feet below the surface. Where unlimed, the Latham soil is extremely acid to strongly acid in the surface layer and extremely acid or very strongly acid in the subsoil and substratum and the Gilpin soil is extremely acid to strongly acid. The depth to bedrock is 20 to 40 inches in both soils.

About two-thirds of the areas of these soils are used as woodland. A few areas are used as hayland or pasture.

These soils are not suited to cultivated crops or hay but are suited to pasture. The hazard of erosion is severe in unprotected areas. If these soils are cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, grassed waterways, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the Latham soil is reasonably firm.

The Latham soil has moderate potential productivity for trees, and the Gilpin soil has moderately high potential productivity on north-facing slopes and moderate potential productivity on south-facing slopes. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

The depth to bedrock, a high shrink-swell potential, low soil strength, the seasonal high water table, slippage, and slope limit most urban uses.

These soils are limited as sites for dwellings with basements. The seasonal high water table, slippage, and slope limit the Latham soil, and slope limits the Gilpin soil. Installing foundation drains, sealing foundations, and backfilling with porous material can minimize the limitation caused by the seasonal high water table. Land shaping and grading can minimize the limitation caused by slope. Avoiding unnecessary disturbance of the soil can minimize the hazard of slippage. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction can reduce the hazards of erosion and slippage. Designing dwellings that conform to the natural slope and setting can keep land shaping, and ultimately erosion, to a minimum.

These soils are limited as sites for septic tank absorption fields. The seasonal high water table, slippage, and slope limit the Latham soil, and the depth to bedrock and slope limit the Gilpin soil. These limitations can be minimized by installing specially designed absorption fields.

These soils are limited as sites for local roads and streets. The high shrink-swell potential, low soil strength, and slope limit the Latham soil, and slope limits the Gilpin soil. Constructing the roads and streets on the contour and on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, slippage, slope, and slow permeability limit use of the included soils for most kinds of urban development.

The capability subclass is VIe. The woodland ordination symbol is 3R in areas of the Latham soil and 4R in areas of the Gilpin soil.

Lo—Lobdell loam

This soil is very deep, nearly level, and moderately well drained. It is on flood plains along streams throughout the northern and central parts of the county. The soil is occasionally flooded during winter and early spring. Slope ranges from 0 to 3 percent.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil is loam, which extends to a depth of 38 inches. The upper 14 inches of the subsoil is dark yellowish brown. The lower 18 inches is dark yellowish brown and is mottled with light brownish gray. The substratum is dark yellowish brown, stratified silt loam and loam mottled with light brownish gray. It extends to a depth of at least 65 inches.

Small areas of the well drained Chagrin and Grigsby soils, the moderately well drained Cotaco and Beech soils, and the poorly drained Melvin soils are included with this soil in mapping. Also included are small areas of soils that are subject to rare flooding; soils with a slope of more than 3 percent; and, in small areas at the head of narrow drainageways, soils with 15 to 35 percent rock fragments in the subsoil. Included soils make up about 25 percent of the unit.

The available water capacity of the Lobdell soil is high. Permeability is moderate in the subsoil and moderate or moderately rapid in the substratum. Runoff is slow. Natural fertility is high. The seasonal high water table is about 1.5 to 3.0 feet below the surface. Where unlimed, this soil is strongly acid to neutral in the solum and moderately acid to neutral in the substratum. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as cropland, hayland, or pasture. A few areas are used as woodland.

This soil is suited to cultivated crops and to hay and pasture. Crops can be grown year after year on this soil, but cover crops are needed to reduce the hazard of erosion. Crop residue management helps to maintain fertility and tilth. There is a risk of crop damage from flooding early in the growing season. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees. Plant competition is a management concern.

The hazard of flooding and the seasonal high water table limit most urban uses. They severely limit this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding limits this soil as a site for local roads and streets. Raised fill above the flood level and cross culverts or another system of surface water removal can minimize this limitation.

The hazard of flooding, low soil strength, a moderate shrink-swell potential, moderately slow permeability, and a seasonal high water table limit use of the included soils for most kinds of urban development.

The capability subclass is IIw. The woodland ordination symbol is 5A.

MaB—Markland silt loam, 3 to 8 percent slopes

This soil is very deep, gently sloping, and moderately well drained. It is on low terraces in backwater areas of lacustrine deposits near the Ohio and Big Sandy Rivers.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 39 inches. The upper 10 inches of the subsoil is light olive brown silty clay loam. The next 6 inches is light olive brown silty clay mottled with light gray. The lower 15 inches is light olive brown silty clay mottled with gray. The substratum is light olive brown silty clay mottled with gray. It extends to a depth of at least 65 inches.

Small areas of the well drained Chagrin and Kanawha soils, the moderately well drained Cotaco and Lobdell soils, and the somewhat poorly drained Guyan soils are included with this soil in mapping. Also included are small areas of soils that are subject to rare flooding, soils with a slope of less than 3 percent, soils with a slope of more than 8 percent, and

Udorthents. Included soils make up about 20 percent of the unit.

The available water capacity of the Markland soil is high. Permeability is slow in the subsoil and substratum. Runoff is medium. Natural fertility is moderate or high. The seasonal high water table is about 1.5 to 3.0 feet below the surface. Where unlimed, this soil is moderately acid to neutral in the surface layer, slightly acid or neutral in the subsoil, and mildly alkaline or moderately alkaline in the substratum. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as hayland, pasture, or cropland. A few areas are used for urban development or woodland.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is moderate in unprotected areas. If this soil is cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees. Seedling mortality and plant competition are management concerns.

A high shrink-swell potential, low soil strength, the seasonal high water table, and slow permeability limit most urban uses.

The high shrink-swell potential limits this soil as a site for dwellings with basements. Building foundations on stable soil or bedrock, using extra reinforcement in footers, backfilling with porous material, and installing a properly designed subsurface drainage system reduce ground-water flow and the amount of moisture under the foundation and thus minimize this limitation.

The seasonal high water table and slow permeability limit this soil as a site for septic tank absorption fields. These limitations can be minimized by installing specially designed absorption fields.

The high shrink-swell potential and low soil strength limit this soil as a site for local roads and streets. Constructing the roads and streets on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The hazard of flooding, low soil strength, a seasonal high water table, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is IIe. The woodland ordination symbol is 4C.

MaC—Markland silt loam, 8 to 15 percent slopes

This soil is very deep, strongly sloping, and moderately well drained. It is on low terraces in backwater areas of lacustrine deposits near the Ohio and Big Sandy Rivers.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 39 inches. The upper 10 inches of the subsoil is light olive brown silty clay loam. The next 6 inches is light olive brown silty clay mottled with light gray. The lower 15 inches is light olive brown silty clay mottled with gray. The substratum is light olive brown silty clay mottled with gray. It extends to a depth of at least 65 inches.

Small areas of the well drained Chagrin and Kanawha soils, the moderately well drained Cotaco, Beech, and Lobdell soils, and the somewhat poorly drained Guyan soils are included with this soil in mapping. Also included are small areas of soils that are subject to rare flooding, soils with a slope of less than 8 percent, soils with a slope of more than 15 percent, and Udorthents. Included soils make up about 25 percent of the unit.

The available water capacity of the Markland soil is high. Permeability is slow in the subsoil and substratum. Runoff is rapid. Natural fertility is moderate or high. The seasonal high water table is about 1.5 to 3.0 feet below the surface. Where unlimed, this soil is moderately acid to neutral in the surface layer, slightly acid or neutral in the subsoil, and mildly alkaline or moderately alkaline in the substratum. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as hayland, pasture, or cropland. A few areas are used for urban development or woodland.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas. If this soil is cultivated, conservation tillage, contour stripcropping, rotations that include hay, cover crops, and crop residue management help to control erosion and maintain fertility and tilth. The major pasture management needs are rotational grazing; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees. Seedling mortality and plant competition are management concerns.

A high shrink-swell potential, low soil strength, the seasonal high water table, and slow permeability limit most urban uses.

The high shrink-swell potential limits this soil as a site for dwellings with basements. Building foundations on stable soil or bedrock, using extra reinforcement in footers, backfilling with porous material, and installing a properly designed subsurface drainage system reduce ground-water flow and the amount of moisture under the foundation and thus minimize the limitation caused by the shrink-swell potential. Installing foundation drains, sealing foundation walls, diverting surface water from higher areas away from homesites, and backfilling with porous material can minimize the limitation caused by the seasonal high water table.

The seasonal high water table and slow permeability limit this soil as a site for septic tank absorption fields. These limitations can be minimized by installing specially designed absorption fields.

The high shrink-swell potential and low soil strength limit this soil as a site for local roads and streets. Constructing the roads and streets on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The hazard of flooding, low soil strength, a moderate shrink-swell potential, moderately slow permeability, a seasonal high water table, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is IIIe. The woodland ordination symbol is 4C.

Me—Melvin silt loam

This soil is very deep, nearly level, and poorly drained. It is in depressions on flood plains along the Big Sandy and Ohio Rivers and other major drainageways. The soil is subject to occasional flooding during winter and early spring. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil extends to a depth of 22 inches. The upper 4 inches of the subsoil is grayish brown silt loam. The next 5 inches is gray silt loam mottled with yellowish brown. The lower 7 inches is light gray silty clay loam mottled with brownish yellow. The substratum is light gray silty clay loam mottled with strong brown. It extends to a depth of at least 65 inches.

Small areas of the well drained Ashton and Huntington soils and the moderately well drained Lindside soils are included with this soil in mapping. Also included are small areas of soils that have more clay in the subsoil than the Melvin soil and small areas of soils with a slope of more than 3 percent. Included soils make up about 20 percent of the unit.

The available water capacity of the Melvin soil is high. Permeability is moderate in the subsoil. Runoff is slow. Natural fertility is moderate or high. The seasonal high water table is at the surface or within 1 foot of the surface. Where unlimed, this soil is moderately acid to mildly alkaline. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as hayland or pasture. A few areas are used as cropland or woodland.

This soil is suited to cultivated crops but is better suited to water-tolerant hay or pasture plants. Crops can be grown year after year in areas that have been drained, but cover crops are needed to reduce the hazard of erosion. The major pasture management needs are rotational grazing; selection of water-tolerant pasture plants; proper stocking rates, which help to maintain a cover of desirable grasses and legumes; and deferment of spring grazing until the soil is reasonably firm.

This soil has moderately high potential productivity for trees that are tolerant of wet sites. Equipment limitations, seedling mortality, and plant competition are management concerns.

The hazard of flooding, low soil strength, and the seasonal high water table limit most urban uses.

The hazard of flooding and the seasonal high water table severely limit this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding, low soil strength, and the seasonal high water table limit this soil as a site for local roads and streets. Raised fill of suitable subgrade above the flood level, a subsurface drainage system, and cross culverts or another system of surface water removal can minimize these limitations.

The hazard of flooding, low soil strength, and a seasonal high water table limit use of the included soils for most kinds of urban development.

The capability subclass is IIIw. The woodland ordination symbol is 5W.

NeD—Nelse silt loam, 3 to 25 percent slopes

This soil is very deep, gently sloping to moderately steep, and well drained. It is on the banks of the Tug Fork of the Big Sandy River and other major drainageways. The soil is subject to frequent flooding in winter and early spring. Floodwater may remain on the surface for 2 to 7 days. Slopes are short and are concave to convex.

Typically, the surface layer is very dark grayish brown silt loam about 11 inches thick. The substratum extends to a depth of at least 65 inches. The upper 18 inches of the substratum is olive brown loamy fine sand. The next 7 inches is yellowish brown loamy fine sand. The next 19 inches is brown loamy sand mottled with dark reddish brown and dark yellowish brown. The lower 10 inches is yellowish brown loamy sand mottled with dark gray.

Small areas of the well drained Ashton, Grigsby, and Kanawha soils and the moderately well drained Cotaco and Lobdell soils are included with this soil in mapping. Also included are small areas of soils that are subject to occasional flooding, soils with a slope of less than 3 percent, and soils with a slope of more than 25 percent. Included soils make up about 20 percent of the unit.

The available water capacity of the Nelse soil is moderate or high. Permeability is moderately rapid in the surface layer and moderately rapid or rapid in the substratum. Runoff is medium or rapid. Natural fertility is moderate. Where unlimed, this soil is strongly acid to moderately alkaline. The depth to bedrock is more than 60 inches.

Most areas of this soil are used as woodland. A few areas are used as cropland or pasture.

This soil is not suited to cultivated crops and to hay and pasture. Where this soil has been cleared of trees, conservation practices are needed to prevent severe streambank erosion.

This soil has very high potential productivity for trees. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

The hazard of flooding and slope limit most urban uses. They severely limit this soil as a site for dwellings with basements and for septic tank absorption fields.

The hazard of flooding and slope limit this soil as a site for local roads and streets. Raised fill above the flood level, cross culverts or another system of surface water removal, and construction of roads and streets on the contour can minimize these limitations.

The hazard of flooding, low soil strength, a seasonal high water table, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is VIe. The woodland ordination symbol is 5R.

PbE—Pineville and Buchanan channery loams, 15 to 35 percent slopes, extremely stony

This undifferentiated group consists of very deep, moderately steep and steep, well drained and moderately well drained soils in coves and on foot slopes and the lower side slopes in the south-central and southern parts of the county. Stones cover 3 to 15 percent of the surface. Some areas of the unit are predominately Pineville soil, some are predominately Buchanan soil, and some have both soils. Areas of each soil are large enough to be mapped separately but are mapped as one unit because of similar use and management requirements. Individual areas are about 45 percent Pineville channery loam, 25 percent Buchanan channery loam, and 30 percent other soils.

Typically, the surface layer of the Pineville soil is dark brown channery loam about 5 inches thick. The subsoil is channery loam, which extends to a depth of 53 inches. The upper 9 inches of the subsoil is light yellowish brown. The next 14 inches is reddish yellow. The lower 25 inches is yellowish brown. The substratum is yellowish brown channery loam mottled with light gray. It extends to a depth of at least 65 inches.

Typically, the surface layer of the Buchanan soil is very dark grayish brown channery loam about 2 inches thick. The subsurface layer is brown channery loam about 3 inches thick. The subsoil extends to a depth of 60 inches. The upper 6 inches of the subsoil is yellowish brown channery loam. The next 9 inches is brownish yellow channery loam. The next 8 inches is brownish yellow channery loam mottled with light gray. The lower 32 inches is a fragipan. The upper 8 inches of the fragipan is light yellowish brown very channery loam mottled with light gray and strong brown, and the lower 24 inches is light gray and yellowish brown very channery loam mottled with brown and light brown. The substratum is light yellowish brown very channery loam mottled with light gray and yellowish brown. It extends to a depth of at least 65 inches.

Small areas of the well drained Dekalb and Gilpin soils and the moderately well drained Dormont and Latham soils are included with these soils in mapping. Also included are small areas of soils that are less than 60 inches deep over bedrock, soils that have a limy subsoil, soils that have lost most or all of their original surface layer because of erosion, soils in areas where less than 3 percent of the surface is covered with stones, soils with a slope of less than 15 percent, soils with a slope of more than 35 percent, and bedrock escarpments.

The available water capacity is moderate or high in the Pineville soil and low or moderate in the Buchanan soil. Permeability is moderate in the subsoil of the Pineville soil. It is moderate above the fragipan in the Buchanan soil and slow in the fragipan. Runoff is very rapid on both soils. Natural fertility is low or moderate in both soils. The Buchanan soil has a seasonal high water table about 1.5 to 3.0 feet below the surface.

Where unlimed, the Pineville soil is extremely acid to neutral in the surface layer and extremely acid to strongly acid in the subsoil and substratum and the Buchanan soil is extremely acid to strongly acid. The depth to bedrock is more than 60 inches in both soils. The Buchanan soil has a fragipan at a depth of 20 to 36 inches. The fragipan severely restricts root development.

Most areas of these soils are used as woodland. A small acreage is used as pasture or hayland.

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. Slope and stones restrict the use of farm machinery. Management concerns are overgrazing and a severe hazard of erosion in unprotected areas. The major pasture management needs are rotational grazing and proper stocking rates, which help to maintain a cover of desirable grasses and legumes.

These soils have moderately high potential productivity for trees on north-facing slopes. The Buchanan soil has moderate potential productivity on south-facing slopes. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

These soils are poorly suited to most urban uses. Slope severely limits the Pineville soil, and the seasonal high water table, slope, and slow permeability severely limit the Buchanan soil.

The depth to bedrock, a high shrink-swell potential, low soil strength, a seasonal high water table, and slope limit use of the included soils for most kinds of urban development.

The capability subclass is VIIs. The woodland ordination symbol is 5R in areas of the Pineville soil and 4R in areas of the Buchanan soil.

Ud—Udorthents, smoothed

These soils are shallow to very deep, nearly level to very steep, and well drained. They consist of a mixture of soil, rock, and/or coal fragments from areas disturbed by excavation, filling, and grading. Also included are areas of coal stockpiling and/or coal refuse reprocessing along the Big Sandy and Ohio Rivers. Most areas are urbanized or are along major highways and railroads. Slope ranges from 0 to 65 percent.

Typically, these soils have a wide range of different textures and amounts of rock and coal fragments. The color of the surface layer, subsurface layer, and substratum ranges from red to light olive brown with varying amounts of black and gray. The depth to bedrock is generally more than 40 inches. It ranges from more than 30 feet in fill areas to 0 inches in areas of exposed bedrock along many road cuts.

Small areas of the well drained Allegheny, Ashton, Chagrin, Dekalb, Gilpin, Grigsby, Huntington, Kanawha, Upshur, and Wheeling soils, the moderately well drained Cotaco, Dormont, Latham, Lindside, Lobdell, and Markland soils, and the somewhat poorly drained Guyan soils are included with these soils in mapping. Included soils make up about 15 percent of the unit.

The available water capacity of the Udorthents ranges from very low to high. Permeability is slow to very rapid. Runoff also is slow to very rapid. Natural fertility is low to high. Where unlimed, these soils are extremely acid to moderately alkaline throughout. The depth to bedrock varies.

These soils generally are not suited to cultivated crops or hay but may have limited suitability for pasture or trees. If the topsoil is removed and stockpiled before excavation or disturbance and replaced after construction, the suitability for cultivated crops, hay, pasture, and trees will be improved.

Because the properties of these soils vary, onsite investigation and testing are necessary to determine the limitations of the soils for specific uses.

The depth to bedrock, the hazard of flooding, low soil strength, a moderate or high shrink-swell potential, a seasonal high water table, slope, and slow or moderately slow permeability limit use of the included soils for most kinds of urban development.

This unit is not assigned to a capability subclass or woodland ordination symbol.

UsB—Urban land-Ashton-Lindside complex, 0 to 8 percent slopes

This complex consists mainly of Urban land and very deep, nearly level and gently sloping, well drained and moderately well drained Ashton and Lindside soils. The Urban land and Ashton and Lindside soils are on flood plains along the Ohio and Big Sandy Rivers in the Ceredo, Huntington, and Kenova areas. Although floodwalls provide protection from floodwaters of the Ohio and Big Sandy Rivers, some areas of the lower Lindside soil may be subject to rare, localized flooding. The two soils and Urban land occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 50 percent Urban land, 20 percent Ashton silt loam, 15 percent Lindside silt loam, and 15 percent other soils.

Urban land is primarily covered by streets, parking lots, buildings, and other structures in residential and business areas.

Typically, the surface layer of the Ashton soil is very dark grayish brown silt loam about 10 inches thick. The subsoil extends to a depth of 55 inches. The upper 8 inches of the subsoil is dark yellowish brown silt loam. The next 30 inches is yellowish brown silty clay loam. The lower 7 inches is yellowish brown loam. The substratum is yellowish brown loam, which extends to a depth of at least 65 inches.

Typically, the surface layer of the Lindside soil is brown silt loam about 9 inches thick. The subsoil extends to a depth of 37 inches. The upper 8 inches of the subsoil is yellowish brown silty clay loam mottled very pale brown. The lower 20 inches is yellowish brown silty clay loam mottled with light gray. The substratum is dark yellowish brown and light gray silty clay loam, which extends to a depth of at least 65 inches.

Small areas of the well drained Huntington and Wheeling soils and the poorly drained Melvin soils are included in this complex in mapping. Also included are small areas of soils with a slope of more than 8 percent and Udorthents.

The available water capacity is high in Ashton and Lindside soils. Permeability is moderate in the subsoil of the Ashton soil. It is moderately slow or moderate in the subsoil of the Lindside soil and moderate or moderately rapid in the substratum. Runoff is slow or medium on the Ashton soil and slow on the Lindside soil. Natural fertility is high in both soils. The Lindside soil has a seasonal high water table about 1.5 to 3.0 feet below the surface. Where unlimed, the Ashton soil is moderately acid to neutral and the Lindside soil is strongly acid to mildly alkaline in the upper part of the solum and moderately acid to mildly alkaline in the lower part of the solum and in the substratum. The depth to bedrock is more than 60 inches in both soils.

Most areas of this complex are used for urban development and are not suited to cultivated crops, hay, pasture, or woodland. Open areas are used primarily for lawns.

Low soil strength and the seasonal high water table limit most urban uses. The Ashton and Lindside soils are protected from flooding by the floodwalls in the Ceredo, Huntington, and Kenova areas.

The Ashton soil has slight limitations as a site for dwellings with basements, whereas the Lindside soil is severely limited by the seasonal high water table. Installing foundation drains, sealing foundations, and backfilling with porous material can minimize this limitation.

The Ashton soil has slight limitations as a site for septic tank absorption fields, whereas the Lindside soil is severely limited by the seasonal high water table and restricted permeability. These limitations can be minimized by installing specially designed absorption fields.

The Ashton and Lindside soils are limited as sites for local roads and streets because of low soil strength. Constructing the roads and streets on suitable subgrade can minimize this limitation.

Low soil strength, a seasonal high water table, and slope limit use of the included soils for most kinds of urban development.

This unit is not assigned to a capability subclass or woodland ordination symbol.

UtD—Urban land-Gilpin-Upshur complex, 15 to 25 percent slopes

This complex consists mainly of Urban land and moderately deep and deep, moderately steep, well drained Gilpin and Upshur soils. The Urban land and Gilpin and Upshur soils are on benches and ridgetops in urban areas, mostly in the northern part of the county. The Upshur soil is subject to slippage. The two soils and Urban land occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 35 percent Urban land, 25 percent Gilpin soil, 15 percent Upshur soil, and 25 percent other soils.

Urban land is primarily covered by streets, parking lots, buildings, and other structures in residential and business areas.

Typically, the surface layer of the Gilpin soil is brown silt loam about 1 inch thick. The subsoil extends to a depth of 22 inches. The upper 5 inches of the subsoil is dark yellowish brown silt loam. The lower 16 inches is yellowish brown channery silty clay loam. Light olive brown, fractured shale and fine grained sandstone bedrock is at a depth of 22 inches.

Typically, the surface layer of the Upshur soil is brown silt loam about 4 inches thick. The subsoil extends to a depth of 40 inches. The upper 4 inches of the subsoil is brown silt loam. The next 10 inches is reddish brown clay. The next 10 inches is dark reddish brown channery clay. The lower 12 inches is weak red channery clay. The substratum is dusky red very channery clay, which extends to weathered shale bedrock at a depth of 45 inches.

Small areas of the well drained Allegheny soils and the moderately well drained Beech and Latham soils are included in this complex in mapping. Also included are small areas of moderately well drained soils that have a dense subsoil and are on terraces near the town of Wayne, soils that are less than 20 inches deep over bedrock, soils that are similar to the Upshur soil but are less than 40 inches deep over bedrock, soils that have lost most or all of their original surface layer because of erosion, soils with a slope of less than 15 percent, and soils with a slope of more than 25 percent.

The available water capacity is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability in the subsoil is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is rapid on both soils. Natural fertility is low or moderate in the Gilpin soil and moderate or high in the Upshur soil. Where unlimed, the Gilpin soil is extremely acid to strongly acid and the Upshur soil is very strongly acid to slightly acid in the surface layer, very strongly acid to moderately acid in the subsoil, and strongly acid to moderately alkaline in the substratum. The depth to bedrock is 20 to 40 inches in the Gilpin soil and 40 to 60 inches in the Upshur soil. The Upshur soil has a high shrink-swell subsoil potential in the subsoil and is highly susceptible to land slips.

Most areas of this complex are used for urban development and are not suited to cultivated crops, hay, pasture, or woodland. Open areas are used primarily for lawns.

The depth to bedrock, a high shrink-swell potential, low soil strength, slippage, slope, and slow permeability limit most urban uses.

The Gilpin and Upshur soils are severely limited as sites for dwellings with basements. Slope limits the Gilpin soil, and a high shrink-swell potential, slippage, and slope limit the Upshur soil. Land shaping and grading can minimize the limitation caused by slope. Avoiding unnecessary disturbance of the soil can minimize the hazard of slippage. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction can reduce the hazards of erosion and slippage. Designing dwellings that conform to the natural slope and setting can keep land shaping, and ultimately erosion, to a minimum. Building foundations on stable soil or bedrock, using extra reinforcement in footers, backfilling with porous material, and installing a properly designed subsurface drainage system reduce ground-water flow and the amount of moisture under the foundation and thus minimize the limitation caused by the shrink-swell potential.

The Gilpin and Upshur soils are severely limited as sites for septic tank absorption fields. The depth to bedrock and slope limit the Gilpin soil, and slippage, slope, and slow permeability limit the Upshur soil. These limitations can be minimized by installing specially designed absorption fields.

The Gilpin and Upshur soils are severely limited as sites for local roads and streets. Slope limits the Gilpin soil, and a high shrink-swell potential, low soil strength, and slope limit the Upshur soil. Constructing the roads and streets on the contour and on suitable subgrade and installing surface and subsurface drainage systems can minimize these limitations.

The depth to bedrock, low soil strength, a moderate or high shrink-swell potential, a seasonal high water table, slippage, and slope limit use of the included soils for most kinds of urban development.

This unit is not assigned to a capability subclass or woodland ordination symbol.

UvB—Urban land-Kanawha-Cotaco complex, 0 to 8 percent slopes

This complex consists mainly of Urban land and very deep, nearly level and gently sloping, well drained and moderately well drained Kanawha and Cotaco soils. The Urban land and Kanawha and Cotaco soils are on high flood plains and low terraces along Twelvepole Creek, the Big Sandy River, and the Tug Fork of the Big Sandy River. This complex is subject to rare flooding. The two soils and Urban land occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 35 percent Urban land, 30 percent Kanawha loam, 25 percent Cotaco loam, and 10 percent other soils.

Urban land is primarily covered by streets, parking lots, buildings, and other structures in residential and business areas.

Typically, the surface layer of the Kanawha soil is dark brown loam about 9 inches thick. The subsoil extends to a depth of 47 inches. The upper 16 inches of the subsoil is strong brown clay loam. The next 15 inches is yellowish brown clay loam. The lower 7 inches is yellowish brown sandy loam. The substratum is yellowish brown and strong brown, stratified loamy sand and sandy loam. It extends to a depth of at least 65 inches.

Typically, the surface layer of the Cotaco soil is brown loam about 8 inches thick. The subsoil extends to a depth of 39 inches. The upper 4 inches of the subsoil is yellowish brown loam. The next 5 inches is yellowish brown loam mottled with pale brown. The next 11 inches is brownish yellow clay loam mottled with light gray. The lower 11 inches is brownish yellow and light gray clay loam. The substratum extends to a depth of at least 65 inches. The upper 11 inches of the substratum is brownish yellow and light gray loam. The lower 15 inches is brownish yellow and light gray channery loam.

Small areas of the well drained Chagrin and Grigsby soils, the moderately well drained Lobdell and Markland soils, the somewhat poorly drained Guyan soils, and the poorly drained Melvin soils are included in this complex in mapping. Also included are small areas of Udorthents, soils that have a subsoil of loamy sand, soils that are subject to occasional flooding, and soils with a slope of more than 8 percent.

The available water capacity is high in the Kanawha and Cotaco soils. Permeability is moderate in the subsoil of the Kanawha soil and moderate or moderately rapid in the substratum. It is moderate in the subsoil of the Cotaco soil. Runoff is slow or medium on both soils. Natural fertility is high in the Kanawha soil and moderate in the Cotaco soil. The Cotaco soil has a seasonal high water table about 1.5 to 2.5 feet below the surface. Where unlimed, the Kanawha soil is strongly acid or moderately acid in the upper part of the solum and moderately acid or slightly acid in the lower part of the solum and in the substratum and the Cotaco soil is extremely acid to strongly acid. The depth to bedrock is more than 60 inches in both soils.

Most areas of this complex are used for urban development and are not suited to cultivated crops, hay, pasture, or woodland. Open areas are used primarily for lawns.

The hazard of flooding, low soil strength, and the seasonal high water table limit most urban uses.

The Kanawha and Cotaco soils are limited as sites for dwellings with basements and for septic tank absorption fields. The hazard of flooding limits the Kanawha soil, and the hazard of flooding and the seasonal high water table limit the Cotaco soil.

The Kanawha and Cotaco soils are limited as sites for local roads and streets. The hazard of flooding and low soil strength limit the Kanawha soil, and the hazard of flooding and the seasonal high water table limit the Cotaco soil. Raised fill of suitable subgrade above the flood level, a subsurface drainage system, and cross culverts or another system of surface water removal can minimize these limitations.

The hazard of flooding, a high shrink-swell potential, low soil strength, a seasonal high water table, slope, and slow permeability limit use of the included soils for most kinds of urban development.

This unit is not assigned to a capability subclass or woodland ordination symbol.

UwB—Urban land-Wheeling complex, 3 to 8 percent slopes

This complex consists mainly of Urban land and a very deep, gently sloping, well drained Wheeling soil. The Urban land and Wheeling soil are on low terraces along the Ohio River, mainly in the Ceredo, Huntington, and Kenova areas. The Wheeling soil and Urban land occur as areas so intermingled on the landscape that it was not practical to map them separately. Individual areas are about 55 percent Urban land, 25 percent Wheeling soil, and 20 percent other soils.

Urban land is primarily covered by streets, parking lots, buildings, and other structures in residential and business areas.

Typically, the surface layer of the Wheeling soil is dark brown loam about 8 inches thick. The subsoil extends to a depth of 49 inches. The upper 24 inches of the subsoil is yellowish brown loam. The next 10 inches is dark yellowish brown loam. The lower 7 inches is dark yellowish brown sandy loam. The substratum is yellowish brown, stratified loamy sand and sandy loam. It extends to a depth of at least 65 inches.

Small areas of the well drained Ashton soils and the moderately well drained Cotaco and Lobdell soils are included in this complex in mapping. Also included are small areas of soils with a slope of less than 3 percent, soils with a slope of more than 8 percent, and Udorthents.

The available water capacity of the Wheeling soil is high. Permeability is moderate in the subsoil and rapid in the substratum. Runoff is medium. Natural fertility is moderate or high. Where unlimed, this soil is strongly acid or moderately acid. The depth to bedrock is more than 60 inches.

Most areas of this complex are used for urban development and are not suited to cultivated crops, hay, pasture, or woodland. Open areas are used primarily for lawns.

The Wheeling soil has slight limitations as a site for dwellings with basements and for septic tank absorption fields.

Low soil strength limits the Wheeling soil as a site for local roads and streets. Constructing the roads and streets on suitable subgrade can minimize this limitation.

Low soil strength and a seasonal high water table limit use of the included soils for most kinds of urban development.

This unit is not assigned to a capability subclass or woodland ordination symbol.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pasture, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 17,140 acres in the survey area, or 5.2 percent of the total acreage, meets the soil requirements for prime farmland. This land is mainly adjacent to the major drainageways in the county.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Richard Heaslip, State Resource Conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for soils in the county, and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Some general management principles apply to all of the soils suited to farm crops and pasture throughout Wayne County. Individual soils or groups of soils, however, require different kinds of management.

Most of the soils in the county have a low or moderate supply of basic plant nutrients and require applications of lime and fertilizer for optimum production. The amounts to be applied depend on the type of soil, the cropping history, the crop to be grown, the desired level of yields, and the results of tests and analyses of individual soil samples. Soil samples may be sent to the West Virginia University Extension Service for testing.

The content of organic matter is low in most of the soils in the county. Increasing the content is not practical. It is important, however, to maintain the current level by returning crop residue to the soil, adding manure, and growing sod crops, cover crops, and green manure crops.

Maintaining the content of organic matter in the plow layer helps to protect the structure of the soil. Tillage tends to break down the structure of the surface layer and should be kept to the minimum necessary to prepare the seedbed and control weeds. In some soils excessive tillage or vehicular traffic can cause the formation of a firm, dense layer directly below the plow layer. The dense layer interferes with water movement and root penetration.

Runoff and erosion on farmland occur primarily while a cultivated crop is growing or soon after harvest. In Wayne County all of the gently sloping or steeper soils that are cultivated are subject to erosion and require a cropping system that helps to control erosion. The chief management needs of such a system include a proper crop rotation, conservation tillage, crop residue management, cover crops, green manure crops, and applications of lime and fertilizer. Other major erosion-control practices are contour cultivation, contour stripcropping, diversions, and grassed waterways. Different combinations of these measures can be equally effective on the same soil. Also, the effectiveness of particular combinations commonly differs from one soil to another.

Using the soil for pasture is effective in controlling erosion in most areas. A high level of pasture management that includes adequate fertilization, controlled grazing, and careful selection of pasture plant mixtures is needed on some soils to provide enough plant cover to prevent excessive erosion. Grazing is controlled by rotation of the livestock from one field to another, allowing idle periods for the regrowth of pasture plants. On some soils plant mixtures that require less renovation can maintain a good ground cover and provide forage for grazing. Management of grazing animals and optimum use of soil amendments, such as lime and fertilizer, can yield desired results.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the county also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961). Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of map units in this survey area is given in the section “Detailed Soil Map Units” and in the yields table.

Woodland Management and Productivity

Charles L. Rowan, State Forester, Natural Resources Conservation Service, helped prepare this section.

In 1989, woodland in Wayne County amounted to 274,900 acres, or 84 percent of the total area (DiGiovanni, 1990). The size of the woodland tracts ranges from small farm woodlots to larger corporate-owned areas of several thousand acres. The largest woodland tracts are in the southern part of the county, which also has many of the largest and best trees left to harvest.

The common forest types, or natural associations of tree species, and their percentage of the wooded area are oak-hickory, 91 percent; oak-pine, 3 percent; elm-ash-red maple, 2 percent; loblolly pine-shortleaf pine, 2 percent; and northern hardwoods, 2 percent (DiGiovanni, 1990).

Woodland plays an important role in the economy of Wayne County. The 274,900 acres of woodland should grow 18.3 million board feet of timber per year on a sustainable basis. The county has six sawmills, which cut about 12 million board feet of lumber per year (Wimer, 1993). A sizable acreage of woodland is accessible to the public in the Beech Fork and East Lynn Lakes recreational areas and the Cabwaylingo State Forest (fig. 7). Most of the woodland in the county is maintained at a low level of management, providing opportunities for recreation, soil conservation, and esthetic benefits. If continued at the present sustainable basis, future harvesting activities should allow woodland to play an important role in the economy of the county for many years to come.

The aspect of some soils, generally those that have a slope of more than 15 percent, affects potential productivity. North aspects are those that face in any compass direction from 315 to 135 degrees. South aspects are those that face in any compass direction from 135 to 315 degrees. The soils on north aspects generally are more moist than those on south aspects and are commonly rated as having higher potential productivity. Aspect can also affect the suitability for different species and the degree of management limitations or hazards.

The potential productivity of the woodland in Wayne County is limited by forest fires and human activities. Fires damage an average of 3,000 acres per year in the county. Burned-over woodland loses much of its capacity to capture and absorb rainfall because the extent of erosion is increased when the tree canopy, surface vegetation, and litter are lost (Wimer, 1993). In addition, past farming and poor timber harvesting practices have resulted in severe erosion on much of the woodland in the county. Despite the effects of these limitations on potential productivity, timber production remains one of the most desirable land uses in the county, especially on the steeper slopes.

Table 8 can help woodland owners or forest managers plan the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, D, C, S, and F.

In the table, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Figure 7.—Mixed pine and hardwood stand in an area of Pineville and Buchanan channery loams, 15 to 35 percent slopes, extremely stony, in the Cabwaylingo State Forest.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed also are subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. It applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Average annual growth of the common trees is expressed in cubic feet, board feet, and cords per acre per year.

Recreation

Michael Marks, District Conservationist, Natural Resources Conservation Service, helped prepare this section.

Because of its proximity to Huntington and other cities in the tri-state area, Wayne County has become a popular destination for outdoor enthusiasts. In addition to the large Federal and State areas at Beech Fork Lake (fig. 8), East Lynn Lake, and the Cabwaylingo State Forest, Wayne County has many other areas that provide opportunities for outdoor recreation. The Ohio River, the Big Sandy River, the Tug Fork of the Big Sandy River, and their tributaries provide ample opportunities for water sports. Golfers do not need to leave the county to play some of the finest courses in the State. Many of the towns in the county have parks and picnic areas.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water

Figure 8.—Campsites at Beech Fork Lake in an area of Udorthents, smoothed.

impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Gary A. Gwinn, State Biologist, Natural Resources Conservation Service, helped prepare this section.

Present and predicted land use patterns in Wayne County favor those species of wildlife that inhabit woodland and the transitional zone between openland and woodland. The county supports large numbers of white-tailed deer. Wild turkeys are increasing in number, and the population of black bear is sufficient for a limited hunting season. The forests of Wayne County also provide favorable habitat for squirrels, ruffed grouse, woodland furbearers, and a variety of cavity-nesting birds.

The populations of most woodland wildlife species are likely to remain steady or increase in the future as land use is not expected to undergo massive change. Large-scale land clearing for agricultural use is a thing of the past. Land clearing does occur on a large scale in the areas of the county used for mining. Much of this clearing and subsequent reclamation increases the amount of "edge" habitat. Edge habitat, the transitional area between land types, such as openland and woodland, is very important to many woodland wildlife species. Thus, mining activities in Wayne County should enhance wildlife populations in the long run, especially if preferred species of plants are used in reclamation. Timber harvesting generally does not harm wildlife populations as the land commonly is returned to timber production. The extent of edge habitat is increased in the short term as the cleared woodland slowly progresses toward maturity. Where desired, certain species of woodland wildlife can be favored by the woodland management and harvesting methods most beneficial to those species.

The population of "farm game" species of wildlife has declined with the reduction in number of small family farms. Bobwhite quail and cottontail rabbits are not so numerous as they were in the past. Such species thrive in areas that have patterns of interspersed pasture and hayland, cropland (especially small grain), and shrub cover. Individual landowners can increase the extent of suitable habitat by creating or enhancing these land use patterns.

The population of several species of waterfowl has increased since the construction of Beech Fork and East Lynn Lakes. Although such populations do not compare in terms of total numbers with those of coastal areas, the reservoirs, ponds, and streams in Wayne County provide better habitat than most regions of the State. County residents can increase the waterfowl population by establishing nesting sites on privately owned ponds.

The reservoirs, rivers, and streams in Wayne County support large populations of several species of game fish, including channel and flathead catfish; largemouth, smallmouth, striped, and white bass; muskellunge and northern pike; sauger and walleye; black and white crappie; and a variety of sunfish. A large variety of nongame fish also is evident. State agencies are involved in stocking programs for rainbow trout in Twelvepole Creek and in the tailwaters of East Lynn Lake. Wayne County also benefits from stocking programs for hybrid game fish in both Beech Fork and East Lynn Lakes. Yearly stocking in both reservoirs increases the population of hybrid striped bass (a striped bass/white bass cross) and saugeye (a sauger/walleye cross). Maintenance or improvement of water quality is essential in these fisheries. The elimination and prevention of pollution from both "point" and "nonpoint" sources should be a priority item for county residents.

Most of the fish and game populations in Wayne County are well established. While a few species are decreasing in number, others are increasing. Habitat manipulation can increase the number of wildlife species in local areas. Landowners can greatly impact wildlife within the perimeters of their personal property.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggartick, quackgrass, and ragweed

Hardwood trees and shrubs produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, and hemlock.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, arrowhead, burreed, pickerelweed, cordgrass, rushes, and sedges.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadow vole, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrats, frogs, and tree swallows.

Engineering

Michael M. Blaine, State Conservation Engineer, Natural Resources Conservation Service, helped prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, soil density, shear strength, bearing strength, and consolidation. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, agricultural waste storage structures, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, or other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment.

Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or of organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A low available water capacity, restricted rooting depth, toxic substances, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$-bar moisture tension. Weight is determined after the soil is dried at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of water movement when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect retention of water and depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on the basis of measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

The table gives estimates of the frequency of flooding. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in the table are depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot.

The first numeral in the range indicates the highest water level. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (USDA, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (USDA, 1975). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section “Detailed Soil Map Units.”

Allegheny Series

The Allegheny series consists of deep, well drained soils formed in acid alluvium washed from soils on uplands. The Allegheny soils are on high terraces along the larger streams in the northern part of the county. Slope ranges from 8 to 15 percent.

Allegheny soils are associated on the landscape with the well drained Gilpin, Kanawha, and Upshur soils and the moderately well drained Beech, Cotaco, and Lobdell soils. Allegheny soils are deeper to bedrock than Gilpin soils and have less clay in the subsoil than Upshur soils. Unlike Allegheny soils, Kanawha soils are subject to flooding. Allegheny soils are better drained than Beech, Cotaco, and Lobdell soils.

Typical pedon of Allegheny loam, bedrock substratum, 8 to 15 percent slopes, in a pasture about 1.9 miles north-northwest of the intersection of West Virginia County Routes 19 and 20 and about 540 yards northwest of the confluence of Hensley Branch and Whites Creek; USGS Burnaugh topographic quadrangle; lat. 38 degrees 17 minutes 12 seconds N. and long. 82 degrees 32 minutes 09 seconds W.

A—0 to 5 inches; brown (10YR 4/3) loam; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; many fine and medium roots; 5 percent rock fragments; slightly acid; clear smooth boundary.

BA—5 to 9 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; many fine roots; 5 percent rock fragments; moderately acid; gradual wavy boundary.

Bt1—9 to 20 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine roots; many distinct clay films on faces of peds; 5 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—20 to 30 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium and coarse subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; 5 percent rock fragments; strongly acid; clear wavy boundary.

BC—30 to 40 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium very pale brown (10YR 7/3) mottles; weak coarse subangular blocky structure; friable; few fine roots; few distinct clay films on faces of peds; 5 percent rock fragments; very strongly acid; gradual wavy boundary.

C—40 to 46 inches; yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) channery fine sandy loam; massive; friable; 20 percent rock fragments; very strongly acid; clear smooth boundary.

2C—46 to 55 inches; brownish yellow (10YR 6/6) channery silt loam; massive; friable; 30 percent rock fragments; strongly acid; abrupt wavy boundary.

2R—55 inches; brown shale bedrock.

The thickness of the solum is 30 to 50 inches, and the depth to bedrock is 48 to 60 inches. The content of rock fragments ranges, by volume, from 0 to 15 percent in the A and Bt horizons, from 0 to 35 percent in the BC and C horizons above any lithologic discontinuity, and from 30 to 80 percent in the 2C horizon. In unlimed areas the soils are extremely acid to strongly acid.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 1 to 4. The fine-earth material is loam.

The BA horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. The fine-earth material is loam or silt loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 8. The fine-earth material is clay loam, sandy clay loam, loam, or sandy loam.

The BC horizon is mottled in shades of brown, red, or yellow. The fine-earth material is fine sandy loam, loam, sandy clay loam, or clay loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. The fine-earth material is fine sandy loam, loam, sandy clay loam, or clay loam.

The 2C horizon has colors similar to those of the C horizon. The fine-earth material ranges from sand to loam.

Some pedons have mottles in shades of brown, red, or yellow and, below the upper 24 inches of the argillic horizon, in shades of gray or olive.

Ashton Series

The Ashton series consists of very deep, well drained soils formed in alluvium washed from limy and acid soils on uplands. The Ashton soils are on low terraces along the Ohio and Big Sandy Rivers. These soils are subject to rare flooding. Slope ranges from 0 to 8 percent.

Ashton soils are associated on the landscape with the well drained Chagrin, Huntington, and Wheeling soils; the moderately well drained Cotaco and Lindside soils; and the poorly drained Melvin soils. Ashton soils are siltier than Chagrin soils, are less frequently flooded than Huntington soils, have less sand in the subsoil than Wheeling soils, and are better drained than Cotaco, Lindside, and Melvin soils.

Typical pedon of Ashton silt loam, in a crop field about 1,200 yards southwest of the intersection of West Virginia County Route 19 and U.S. Route 52 and about 200 yards east of the Big Sandy River; USGS Burnaugh topographic quadrangle; lat. 38 degrees 18 minutes 01 second N. and long. 82 degrees 34 minutes 47 seconds W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak medium subangular blocky structure parting to weak fine and medium granular; very friable; many fine and medium roots; neutral; abrupt smooth boundary.

BA—10 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; 5 percent rock fragments; neutral; clear smooth boundary.

Bt1—18 to 38 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; many distinct clay films on faces of peds; neutral; clear wavy boundary.

Bt2—38 to 48 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; few fine roots; many distinct clay films on faces of peds; neutral; clear wavy boundary.

BC—48 to 55 inches; yellowish brown (10YR 5/6) loam; weak coarse subangular blocky structure; friable; neutral; gradual wavy boundary.

C—55 to 65 inches; yellowish brown (10YR 5/6) loam; few fine light gray (10YR 7/2) mottles; massive; friable; neutral.

The thickness of the solum is 40 to 60 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 5 percent in the solum and from 0 to 10 percent in the C horizon. In unlimed areas the soils are moderately acid to neutral.

The Ap horizon has hue of 7.5YR or 10YR, value of 3, and chroma of 2 or 3. The fine-earth material is silt loam.

The BA horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 2 to 4. The fine-earth material is silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. The fine-earth material is silty clay loam or silt loam.

The BC horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. The fine-earth material is loam.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. The fine-earth material is loam, silt loam, silty clay loam, or fine sandy loam.

Beech Series

The Beech series consists of very deep, moderately well drained soils formed in mixed colluvium derived from sandstone, shale, and siltstone. These soils are on foot slopes, on colluvial fans, and in coves in the northern half of the county. Slope ranges from 3 to 35 percent.

Beech soils are associated on the landscape with the well drained Allegheny, Dekalb, Gilpin, and Upshur soils and the moderately well drained Cotaco, Dormont, Latham, Lobdell, and Markland soils. Beech soils are deeper to bedrock than Latham soils and have a higher content of rock fragments and sand in the solum than Dormont and Markland soils. Unlike Beech soils, Lobdell and Cotaco soils are subject to flooding. Beech soils are less well drained than Allegheny, Dekalb, Gilpin, and Upshur soils.

Typical pedon of Beech loam, 15 to 25 percent slopes, in a mixed hardwood and shortleaf pine forest about 500 yards east of the junction of Long Branch Road and Butler Branch and about 1,000 yards southeast of the Cabell County line; USGS Winslow topographic quadrangle; lat. 38 degrees 18 minutes 12 seconds N. and long. 82 degrees 19 minutes 38 seconds W.

Oi—1 inch to 0; partially decomposed leaf litter, twigs, and pine needles.

A—0 to 6 inches; brown (10YR 4/3) loam; moderate fine and medium granular structure; very friable; many fine and medium roots; 10 percent rock fragments; strongly acid; abrupt wavy boundary.

BA—6 to 9 inches; yellowish brown (10YR 5/4) channery loam; weak medium subangular blocky structure; friable; many fine and medium roots; 15 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—9 to 21 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular blocky structure; friable; many fine and medium roots; common discontinuous clay films on faces of peds; 20 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—21 to 35 inches; strong brown (7.5YR 5/6) channery clay loam; common fine and medium light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; common fine and medium roots; common or many discontinuous clay films on faces of peds; common fine and medium iron and manganese concretions; 20 percent rock fragments; strongly acid; gradual wavy boundary.

Bt3—35 to 44 inches; yellowish brown (10YR 5/6) very channery loam; common fine and medium light brownish gray (10YR 6/2) mottles; weak medium and coarse subangular blocky structure; firm; few medium roots; common discontinuous clay films on faces of peds; common fine and medium iron and manganese concretions; 35 percent rock fragments; strongly acid; gradual wavy boundary.

BC—44 to 51 inches; yellowish brown (10YR 5/6) very channery loam; many medium light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; firm; few medium roots; common fine and medium iron and manganese concretions; 40 percent rock fragments; strongly acid; gradual wavy boundary.

C—51 to 65 inches; strong brown (7.5YR 5/6) and light gray (10YR 7/1) very channery loam; massive; friable; common iron and manganese concretions; 60 percent rock fragments; strongly acid.

The thickness of the solum is 40 to 60 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 10 to 30 percent in the A and BA horizons and from 15 to 60 percent in the Bt, BC, and C horizons and averages 15 to 35 percent, by volume, in the particle-size control section. In unlimed areas the soils are very strongly acid to moderately acid.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 2 to 4. The fine-earth material is loam.

The BA horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The fine-earth material is loam or silt loam.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 8. The fine-earth material is loam or clay loam.

The BC horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 to 7, and chroma of 2 to 8. The fine-earth material is loam or clay loam.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 8. The fine-earth material is loam, silt loam, or clay loam.

Buchanan Series

The Buchanan series consists of very deep, moderately well drained soils formed in acid colluvium derived from sandstone, siltstone, and shale. These soils are on foot slopes in the southern half of the county. Slope ranges from 15 to 35 percent.

Buchanan soils are associated on the landscape with the somewhat excessively drained Fiveblock soils; the well drained Dekalb, Gilpin, Guyandotte, and Pineville soils; and the moderately well drained Dormont and Latham soils. Buchanan soils are less well drained than Dekalb, Fiveblock, Gilpin, Guyandotte, and Pineville soils. They have a fragipan, which is not typical of any of the associated soils.

Typical pedon of Buchanan channery loam, in an area of Pineville and Buchanan channery loams, 15 to 35 percent slopes, extremely stony, in a forest about 2.3 miles southeast of the confluence of the Right Fork and Left Fork of Rich Creek and 1.25 miles southwest of Porter Knob in the headwaters of the Left Fork of Rich Creek; USGS Kiahsville topographic quadrangle; lat. 38 degrees 02 minutes 53 seconds N. and long. 82 degrees 21 minutes 22 seconds W.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) channery loam; weak fine and medium granular structure; very friable; many fine and medium roots; 20 percent rock fragments; very strongly acid; abrupt wavy boundary.

E—2 to 5 inches; brown (10YR 5/3) channery loam; weak fine and medium granular structure; very friable; many fine and medium roots; 15 percent rock fragments; very strongly acid; abrupt smooth boundary.

BE—5 to 11 inches; yellowish brown (10YR 5/4) channery loam; weak fine and medium subangular blocky structure; friable; many medium roots; 15 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—11 to 20 inches; brownish yellow (10YR 6/6) channery loam; moderate medium subangular blocky structure; friable; common medium and coarse roots; common distinct clay films on faces of peds; 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—20 to 28 inches; brownish yellow (10YR 6/6) channery loam; common fine light gray (10YR 7/2) mottles; weak medium and coarse subangular blocky structure; firm; few medium and coarse roots; common distinct clay films on faces of peds; 30 percent rock fragments; very strongly acid; clear wavy boundary.

Bx1—28 to 36 inches; light yellowish brown (10YR 6/4) very channery loam; many fine and medium light gray (10YR 7/1) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; very firm and brittle; few fine and medium roots along faces of peds; few distinct clay films on faces of peds; many fine and medium iron and manganese concretions; 40 percent rock fragments; very strongly acid; clear wavy boundary.

Bx2—36 to 60 inches; light gray (10YR 7/1) and yellowish brown (10YR 5/6) very channery loam; many medium brown (7.5YR 4/4) and light brown (7.5YR 6/4) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; very firm and brittle; few medium roots along faces of peds; few faint clay films on faces of secondary peds; many medium and coarse iron and manganese concretions; 40 percent rock fragments; strongly acid; gradual wavy boundary.

C—60 to 65 inches; light yellowish brown (2.5Y 6/4) very channery loam; many medium and coarse light gray (2.5Y 7/2) and yellowish brown (10YR 5/6) mottles; massive; firm; many medium and coarse iron and manganese concretions; 35 percent rock fragments; strongly acid.

The thickness of the solum is 40 to 60 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 40 percent in individual horizons above the fragipan and from 5 to 60 percent in the fragipan and in the C horizon and averages 15 to 35 percent, by volume, in the control section. Depth to the fragipan ranges from 20 to 36 inches. In unlimed areas the soils are extremely acid to strongly acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 1 to 4. The fine-earth material is loam.

The E horizon has hue of 10YR, value of 5, and chroma of 3. The fine-earth material is loam.

The BE and Bt horizons have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. The fine-earth material is loam, sandy clay loam, clay loam, or silt loam.

The Bx horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. It has few to many mottles. The fine-earth material is loam, sandy clay loam, clay loam, or silt loam. This horizon has weak or moderate prismatic structure parting to platy or blocky structure. It is firm or very firm and is brittle.

The C horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 6. The fine-earth material is loam, sandy loam, sandy clay loam, clay loam, silt loam, or clay.

Chagrin Series

The Chagrin series consists of very deep, well drained soils formed in alluvium washed from limy and acid soils on uplands. The Chagrin soils are on flood plains in the northern part of the county. Slope ranges from 0 to 3 percent.

Chagrin soils are associated on the landscape with the well drained Ashton, Huntington, Kanawha, and Wheeling soils; the moderately well drained Cotaco, Lindside, and Lobdell soils; the somewhat poorly drained Guyan soils; and the poorly drained Melvin soils. Chagrin soils are more frequently flooded than Ashton and Kanawha soils. They have more sand in the subsoil than Huntington soils. Wheeling soils are not subject to flooding. Chagrin soils are better drained than Cotaco, Guyan, Lindside, Lobdell, and Melvin soils.

Typical pedon of Chagrin silt loam, in a field about 180 yards east-southeast of the confluence of Falls Branch and Beech Fork, about 820 yards west of the Beech Fork Lake Dam, and 40 yards north of Beech Fork; USGS Lavalette topographic quadrangle; lat. 38 degrees 18 minutes 21 seconds N. and long. 82 degrees 25 minutes 28 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; very friable; many fine and medium roots; slightly acid; clear smooth boundary.

Bw—8 to 34 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; slightly acid; gradual wavy boundary.

BC—34 to 45 inches; dark yellowish brown (10YR 4/4) loam; weak coarse subangular blocky structure; friable; common fine roots; slightly acid; gradual wavy boundary.

C1—45 to 52 inches; dark yellowish brown (10YR 4/4) loam; massive; friable; few fine roots; slightly acid; clear smooth boundary.

C2—52 to 65 inches; yellowish brown (10YR 5/4) sandy loam; massive; very friable; slightly acid.

The thickness of the solum is 24 to 48 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 15 percent in the Ap horizon and from 0 to 15 percent in the Bw, BC, and C horizons. In unlimed areas the soils are moderately acid to neutral.

The Ap horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 2 to 4. The fine-earth material is silt loam.

The Bw and BC horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. The fine-earth material is silt loam, loam, fine sandy loam, clay loam, silty clay loam, sandy clay loam, or sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. It is sandy loam, loam, or silt loam.

Cotaco Series

The Cotaco series consists of very deep, moderately well drained soils formed in alluvium washed from limy and acid soils on uplands. The Cotaco soils are on low terraces along the Big Sandy River, the Tug Fork of the Big Sandy River, Twelvepole Creek, and other drainageways throughout the county. Slope ranges from 0 to 8 percent.

Cotaco soils are associated on the landscape with the well drained Allegheny, Ashton, Chagrin, Grigsby, Huntington, Kanawha, and Nelse soils; the moderately well drained Beech, Lobdell, and Markland soils; the somewhat poorly drained Guyan soils; and the poorly drained Melvin soils. Cotaco soils are less frequently flooded than Huntington and Lobdell soils, have less clay in the subsoil than Markland soils, and are less well drained than Allegheny, Ashton, Chagrin, Grigsby, Kanawha, and Nelse soils and better drained than Guyan and Melvin soils.

Typical pedon of Cotaco loam, 3 to 8 percent slopes, about 3.9 miles south of the confluence of Buffalo Creek and Twelvepole Creek and 0.8 mile northwest of Mills Chapel, in a pasture about 500 feet northeast of Buffalo Creek; USGS Burnaugh topographic quadrangle; lat. 38 degrees 17 minutes 53 seconds N. and long. 82 degrees 30 minutes 32 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3 and 5/3) loam; moderate fine or medium granular structure; very friable; many fine and medium roots; mildly alkaline; abrupt smooth boundary.

BA—8 to 12 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; common fine and medium roots; neutral; clear wavy boundary.

Bt1—12 to 17 inches; yellowish brown (10YR 5/4) loam; common pale brown (10YR 6/3) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; common discontinuous clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—17 to 28 inches; brownish yellow (10YR 6/6) clay loam; many medium light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; few fine roots; common manganese concretions; common discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.

BC—28 to 39 inches; brownish yellow (10YR 6/6) and light gray (10YR 7/2) clay loam; weak medium prismatic structure parting to weak coarse subangular blocky; friable; few fine roots; common manganese coatings on faces of peds; strongly acid; gradual wavy boundary.

C1—39 to 50 inches; brownish yellow (10YR 6/6) and light gray (10YR 7/2) loam; massive; friable; 5 percent rock fragments; strongly acid; gradual wavy boundary.

C2—50 to 65 inches; brownish yellow (10YR 6/6) and light gray (10YR 7/2) channery loam; massive; friable; many manganese concretions; 15 percent rock fragments; strongly acid.

The thickness of the solum is 30 to 50 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 30 percent in the solum and from 0 to 50 percent in the C horizon. In unlimed areas the soils are extremely acid to strongly acid.

The Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. The fine-earth material is loam.

The BA horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. The fine-earth material is loam or silt loam.

The Bt and BC horizons have hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. The lower subhorizons of the Bt horizon and the BC horizon may be dominantly gray. The fine-earth material is loam, clay loam, sandy clay loam, or silt loam.

The C horizon has hue of 7.5YR to 2.5Y or is neutral in hue. It has value of 4 to 8 and chroma of 0 to 8. The fine-earth material is loam, clay loam, sandy clay loam, or silt loam or is stratified.

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils formed in acid material weathered from sandstone. These soils are on ridgetops and side slopes, mainly in the southern and central parts of the county. Slope ranges from 25 to 65 percent.

Dekalb soils are associated on the landscape with the somewhat excessively drained Fiveblock soils; the well drained Gilpin, Guyandotte, and Pineville soils; and the moderately well drained Beech, Buchanan, Dormont, and Latham soils. Dekalb soils are shallower than Fiveblock and Guyandotte soils, have a higher content of sand and rock fragments in the subsoil than Gilpin and Pineville soils, and are better drained than Beech, Buchanan, Dormont, and Latham soils.

Typical pedon of Dekalb channery sandy loam, in an area of Dekalb-Gilpin complex, 35 to 65 percent slopes, very stony, in a forest about 1,500 feet south-southeast of the intersection of West Virginia County Routes 18 and 20; USGS Prichard topographic quadrangle; lat. 38 degrees 14 minutes 22 seconds N. and long. 82 degrees 33 minutes 12 seconds W.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) channery sandy loam; weak fine granular structure; very friable; many very fine, fine, medium, and coarse roots; 15 percent rock fragments; extremely acid; abrupt smooth boundary.

BA—1 to 4 inches; brown (10YR 5/3) channery sandy loam; weak fine subangular blocky structure parting to weak fine granular; very friable; many very fine, fine, and medium and few coarse roots; 15 percent rock fragments; strongly acid; clear wavy boundary.

Bw1—4 to 13 inches; yellowish brown (10YR 5/4) channery sandy loam; weak fine subangular blocky structure parting to weak fine granular; very friable; many very fine and fine and common medium and coarse roots; 20 percent rock fragments; strongly acid; gradual wavy boundary.

Bw2—13 to 23 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak fine and medium subangular blocky structure; friable; few very fine, fine, and medium roots; 35 percent rock fragments; strongly acid; clear wavy boundary.

BC—23 to 33 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak fine subangular blocky structure; friable; few fine and medium roots; 60 percent rock fragments; strongly acid; abrupt wavy boundary.

R—33 inches; fractured sandstone.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The content of rock fragments ranges, by volume, from 10 to 60 percent in individual horizons of the solum and from 50 to 90 percent in the C horizon, if one occurs. It averages 35 to 75 percent, by volume, in the particle-size control section. In unlimed areas the soils are extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The fine-earth material is sandy loam.

The BA horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The fine-earth material is fine sandy loam, sandy loam, or loam.

The Bw and BC horizons have hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 4 to 8. The fine-earth material is sandy loam, fine sandy loam, or loam.

Dormont Series

The Dormont series consists of deep, moderately well drained soils formed in limy material weathered from interbedded siltstone and shale. These soils are on benches and side slopes in the central and southern parts of the county. Slope ranges from 15 to 35 percent.

Dormont soils are associated on the landscape with the well drained Dekalb, Gilpin, Guyandotte, and Pineville soils and the moderately well drained Beech, Buchanan, and Latham soils. Dormont soils have a lower content of sand and rock fragments in the subsoil than Beech soils and do not have a fragipan, which is typical of Buchanan soils. Dormont soils have less clay in the subsoil than Latham soils and are less well drained than Dekalb, Gilpin, Guyandotte, and Pineville soils.

Typical pedon of Dormont silt loam, in an area of Dormont-Latham complex, 15 to 25 percent slopes, in an old meadow about 130 yards southeast of a dirt road on Napier Ridge and about 1.7 miles southwest of East Lynn Dam; USGS Wayne topographic quadrangle; lat. 38 degrees 07 minutes 33 seconds N. and long. 82 degrees 24 minutes 18 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; very friable; many fine and medium roots; 10 percent rock fragments; strongly acid; abrupt wavy boundary.

BA—7 to 11 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; many fine and medium roots; 10 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—11 to 23 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; 10 percent rock fragments; strongly acid; gradual wavy boundary.

Bt2—23 to 30 inches; strong brown (7.5YR 5/6) channery silty clay loam; common fine light gray (2.5Y 7/2) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; 15 percent rock fragments; strongly acid; gradual wavy boundary.

Bt3—30 to 40 inches; strong brown (7.5YR 5/6) channery silty clay loam; many fine and medium light gray (2.5Y 7/2) mottles; weak fine and medium subangular blocky structure; firm; few fine roots; common distinct clay films and silt films on faces of peds; common fine and medium iron and manganese concretions; 20 percent rock fragments; strongly acid; gradual wavy boundary.

C—40 to 54 inches; strong brown (7.5YR 5/6) very channery silty clay loam; many coarse light gray (10YR 7/2) mottles; massive; firm; common fine and medium iron and manganese concretions; 40 percent rock fragments; strongly acid; abrupt wavy boundary.

Cr—54 inches; weathered siltstone.

The thickness of the solum is 36 to 60 inches, and the depth to bedrock is 48 to 60 inches. The content of rock fragments ranges, by volume, from 0 to 15 percent in the A horizon, from 2 to 15 percent in the upper part of the B horizon, from 5 to 30 percent in the lower part of the B horizon, and from 5 to 50 percent in the C horizon. In unlimed areas the soils are very strongly acid to moderately acid in the upper part of the solum and strongly acid or moderately acid in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 6. The fine-earth material is silt loam.

The BA horizon and the upper part of the Bt horizon have hue of 7.5YR to 2.5Y and value and chroma of 4 to 6. The fine-earth material is silty clay loam or silt loam.

The lower part of the Bt horizon has hue of 7.5YR to 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 2 to 4. The fine-earth material is silty clay loam, silty clay, or clay.

The C horizon has colors similar to those of the lower part of the Bt horizon. The fine-earth material ranges from silt loam to clay.

Fiveblock Series

The Fiveblock series consists of very deep, somewhat excessively drained soils formed in partially weathered fine-earth material and rock fragments of neutral sandstone, shale, siltstone, and coal material. This material was unearthed as a result of the surface mining of coal. These soils are on benches and side slopes, mainly in the southern part of the county. Slope ranges from 35 to 65 percent.

Fiveblock soils are associated on the landscape with the well drained Dekalb, Gilpin, Guyandotte, and Pineville soils and the moderately well drained Buchanan soils. Fiveblock soils are deeper than Dekalb soils, have a thinner dark surface layer than that of Guyandotte soils, have a higher content of sand and rock fragments in the subsoil than Gilpin and Pineville soils, and are better drained than Buchanan soils.

Typical pedon of Fiveblock channery sandy loam, very steep, very stony, on a reclaimed hillside about 1.4 miles south of the confluence of Open Fork and the East Fork of Twelvepole Creek and about 750 yards north-northeast of Williamson Cemetery; USGS Wilsondale topographic quadrangle; lat. 37 degrees 57 minutes 46 seconds N. and long. 82 degrees 17 minutes 21 seconds W.

A—0 to 9 inches; yellowish brown (10YR 5/4) channery sandy loam that has pockets of fine sandy loam and loam; few medium brownish yellow (10YR 6/8) and few fine and medium grayish brown (10YR 5/2) lithochromic mottles; weak fine and medium granular structure; friable; many very fine and fine roots; 20 percent rock fragments (85 percent gray sandstone and 15 percent brown sandstone); moderately acid; gradual wavy boundary.

C1—9 to 23 inches; dark yellowish brown (10YR 4/4) very channery sandy loam; common fine light yellowish brown (2.5Y 6/4) and few very fine yellowish brown (10YR 5/8) lithochromic mottles with pockets of few fine black (N 2/0) carbolithic mottles; massive; friable; common very fine and fine roots; 40 percent rock fragments (90 percent gray sandstone and 10 percent brown sandstone); neutral; gradual irregular boundary.

C2—23 to 43 inches; brown (10YR 5/3) very channery sandy loam that has pockets of loamy sand; few fine and medium yellowish brown (10YR 5/6 and 5/8) lithochromic mottles; massive; friable; few very fine and fine roots; 45 percent rock fragments (90 percent gray sandstone, 8 percent brown sandstone, and 2 percent carbolithic material); mildly alkaline; abrupt wavy boundary.

C3—43 to 65 inches; brown (10YR 5/3) very channery sandy loam; few fine and medium yellowish brown (10YR 5/6 and 5/8) lithochromic mottles; massive; friable; few very fine roots; 55 percent rock fragments (80 percent gray sandstone, 19 percent brown sandstone, and 1 percent carbolithic material); mildly alkaline.

The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 80 percent, by volume, throughout the profile and averages more than 35 percent, by volume, in the particle-size control section. The rock fragments are at least 65 percent gray, neutral sandstone. The remaining percentage is made up of brown sandstone, siltstone, shale, and coal. In unlimed areas the soils are moderately acid to mildly alkaline.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. The fine-earth material is sandy loam.

The C horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 6. The fine-earth material is sandy loam with zones of loamy sand.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils formed in acid material weathered from interbedded shale, siltstone, and sandstone. These soils are on ridgetops, benches, and side slopes throughout the county. Slope ranges from 8 to 65 percent.

Gilpin soils are associated on the landscape with the somewhat excessively drained Fiveblock soils; the well drained Allegheny, Dekalb, Guyandotte, Pineville, and Upshur soils; and the moderately well drained Beech, Buchanan, Dormont, and Latham soils. Gilpin soils are shallower than Allegheny, Guyandotte, and

Pineville soils; have a lower content of sand and rock fragments in the subsoil than Dekalb and Fiveblock soils; have less clay in the subsoil than Upshur soils; and are better drained than Beech, Dormont, and Latham soils.

Typical pedon of Gilpin silt loam, in an area of Gilpin-Upshur complex, 35 to 65 percent slopes, in a forest about 1.5 miles east of Booten and about 660 yards east-southeast of the confluence of Adkins Branch and Fisher Bowen Branch; USGS Winslow topographic quadrangle; lat. 38 degrees 16 minutes 13 seconds N. and long. 82 degrees 21 minutes 10 seconds W.

Oe—1 inch to 0; partially decomposed hardwood leaf litter.

A—0 to 1 inch; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many very fine, fine, and medium and few coarse roots; 5 percent rock fragments; strongly acid; abrupt smooth boundary.

BA—1 to 6 inches; dark yellowish brown (10YR 4/4) silt loam; weak very fine and fine subangular blocky structure; very friable; many very fine, fine, and medium and common coarse roots; 10 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—6 to 17 inches; yellowish brown (10YR 5/4) channery silty clay loam; moderate medium subangular blocky structure; friable; common fine and few medium and coarse roots; few faint clay films on faces of peds and in root channels; 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—17 to 22 inches; yellowish brown (10YR 5/4) channery silty clay loam; weak medium subangular blocky structure; friable; common medium and few fine roots; common faint clay films on faces of peds and in root channels; 30 percent rock fragments; very strongly acid; abrupt smooth boundary.

Cr—22 inches; light olive brown (2.5Y 5/4), fractured shale and fine grained sandstone.

The thickness of the solum is 18 to 36 inches, and the depth to bedrock is 20 to 40 inches. The content of rock fragments ranges from 5 to 40 percent, by volume, in the solum. In unlimed areas the soils are extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 5. The fine-earth material is silt loam.

The BA horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 5. The fine-earth material is silt loam or loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. The fine-earth material is silty clay loam, loam, silt loam, or clay loam.

Grigsby Series

The Grigsby series consists of very deep, well drained soils formed in alluvium washed from limy and acid soils on uplands. The Grigsby soils are on flood plains along both forks of Twelvepole Creek and along other drainageways, mostly in the southern and central parts of the county. Slope ranges from 0 to 3 percent.

Grigsby soils are associated on the landscape with the well drained Kanawha and Nelse soils; the moderately well drained Cotaco, Lobdell, and Markland soils; the somewhat poorly drained Guyan soils; and the poorly drained Melvin soils. Grigsby soils have a thinner dark surface layer than that of Nelse soils and are on more nearly level flood plains; have more sand in the subsoil than Kanawha soils; and are better drained than Cotaco, Guyan, Lobdell, Markland, and Melvin soils.

Typical pedon of Grigsby loam, in a crop field about 280 yards east-northeast of the intersection of West Virginia State Routes 152 and 37 and about 210 yards northeast of the confluence of Trace Fork and the West Fork of Twelvepole Creek; USGS Wayne topographic quadrangle; lat. 38 degrees 10 minutes 43 seconds N. and long. 82 degrees 28 minutes 44 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) loam; weak medium subangular blocky structure parting to moderate fine and medium granular; very friable; many fine and medium roots; moderately acid; clear smooth boundary.

AB—7 to 12 inches; brown (10YR 4/3) sandy loam; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; common fine and medium roots; slightly acid; abrupt smooth boundary.

Bw1—12 to 20 inches; brownish yellow (10YR 6/6) sandy loam; weak coarse subangular blocky structure; very friable; common fine roots; slightly acid; clear smooth boundary.

Bw2—20 to 31 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; common fine roots; moderately acid; gradual wavy boundary.

BC—31 to 42 inches; yellowish brown (10YR 5/4) sandy loam that has pockets of silt loam; weak medium and coarse subangular blocky structure; very friable; few fine roots; slightly acid; gradual wavy boundary.

C—42 to 65 inches; yellowish brown (10YR 5/4) sandy loam that has small bands of yellowish brown (10YR 5/6) material; massive; very friable; few fine roots; slightly acid.

The thickness of the solum is 30 to 50 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 15 percent in the solum and from 0 to 60 percent in the C horizon. In unlimed areas the soils are moderately acid to neutral in the solum and strongly acid to neutral in the C horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The fine-earth material is loam.

The AB horizon has hue of 10YR, value of 4, and chroma of 3. The fine-earth material is sandy loam.

The Bw and BC horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. The fine-earth material is sandy loam, fine sandy loam, loam, or silt loam.

The C horizon has colors similar to those of the Bw horizon and is commonly stratified. The fine-earth material is sandy loam, fine sandy loam, loamy fine sand, or loam.

Guyan Series

The Guyan series consists of very deep, somewhat poorly drained soils formed in alluvium washed from acid soils on uplands. The Guyan soils are on low terraces along the Big Sandy River, Twelvepole Creek, and other major drainageways. Slope ranges from 0 to 3 percent.

Guyan soils are associated on the landscape with the well drained Chagrin, Grigsby, and Kanawha soils; the moderately well drained Cotaco, Lobdell, and Markland soils; and the poorly drained Melvin soils. Guyan soils are less well drained than Chagrin, Cotaco, Grigsby, Kanawha, Lobdell, and Markland soils and better drained than Melvin soils.

Typical pedon of Guyan silt loam, in a hay field about 1.1 miles southwest of the confluence of Elijah Creek and the Big Sandy River and about 0.8 mile north-northeast of the intersection of West Virginia County Route 52/71 and U.S. Route 52; USGS Prichard topographic quadrangle; lat. 38 degrees 14 minutes 09 seconds N. and long. 82 degrees 36 minutes 09 seconds W.

Ap—0 to 4 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; friable; many very fine and fine and common medium roots; slightly acid; abrupt smooth boundary.

BA—4 to 10 inches; light olive brown (2.5Y 5/4) silt loam; few fine dark brown (10YR 3/3) organic stains; moderate medium and coarse subangular blocky structure; friable; common very fine and fine and few medium roots; moderately acid; clear wavy boundary.

Bt—10 to 17 inches; light yellowish brown (2.5Y 6/4) silt loam; many fine and medium brownish yellow (10YR 6/6) and common fine and medium light gray (2.5Y 7/2) mottles; moderate medium and coarse subangular blocky structure; friable; common very fine and fine and few medium roots; strongly acid; clear wavy boundary.

Btg1—17 to 31 inches; light gray (2.5Y 7/2) clay loam; common medium and coarse yellowish brown (10YR 6/6), few fine and medium light yellowish brown (2.5Y 6/4), and few fine and medium yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; friable; few very fine and fine roots; many distinct clay films on faces of peds and in pores; strongly acid; diffuse irregular boundary.

Btg2—31 to 44 inches; light brownish gray (2.5Y 6/2) clay loam; many fine, medium, and coarse yellowish brown (10YR 5/6) and common medium light yellowish brown (2.5Y 6/4) mottles; weak coarse and very coarse subangular blocky structure; friable; few very fine roots; common distinct clay films on faces of peds and in pores; common fine black manganese concretions; very strongly acid; gradual wavy boundary.

BCg—44 to 57 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine, medium, and coarse yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak coarse angular blocky; firm; few very fine roots; few fine black manganese concretions; very strongly acid; gradual wavy boundary.

Cg—57 to 65 inches; light brownish gray (2.5Y 6/2) silty clay loam; common yellowish brown (10YR 5/6) and common light gray (10YR 7/1) mottles; massive; firm; few very fine roots; strongly acid.

The thickness of the solum is 30 to 60 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 10 percent, by volume, throughout the solum. In unlimed areas the soils are very strongly acid to neutral in the Ap and BA horizons and very strongly acid or strongly acid in the Bt, BC, and C horizons.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. The fine-earth material is silt loam.

The BA horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. The fine-earth material is silt loam or loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 1 to 6. The fine-earth material is silt loam, clay loam, silty clay loam, or loam.

The BC horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 2 to 6. The fine-earth material is silty clay loam, clay loam, silt loam, or loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 1 to 8. The fine-earth material is silty clay loam, clay loam, silt loam, or loam or is stratified.

Guyandotte Series

The Guyandotte series consists of very deep, well drained soils formed in acid colluvium derived predominantly from sandstone and from some siltstone. These soils are on north-facing side slopes and in coves in the southern part of the county. Slope ranges from 35 to 65 percent.

Guyandotte soils are associated on the landscape with the somewhat excessively drained Fiveblock soils; the well drained Dekalb, Gilpin, and Pineville soils; and the moderately well drained Buchanan, Dormont, and Latham soils. Guyandotte soils have a thicker dark surface layer than that of Fiveblock soils, have a higher content of rock fragments in the subsoil than Gilpin and Pineville soils, are deeper than Dekalb soils, and are better drained than Buchanan, Dormont, and Latham soils.

Typical pedon of Guyandotte channery loam, in an area of Dekalb-Pineville-Guyandotte association, very steep, extremely stony, in a forest about 0.4 mile west of the confluence of Turkey Creek and the West Fork of Twelvepole Creek and about 1.0 mile southeast of the confluence of Spruce Fork and Right Fork, 140 yards west and downslope from the Beech Ridge Trail; USGS Wilsondale topographic quadrangle; lat. 37 degrees 57 minutes 20 seconds N. and long. 82 degrees 20 minutes 48 seconds W.

Oi—1 inch to 0; hardwood leaf litter.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) channery loam, dark grayish brown (10YR 4/2) dry; moderate fine and very fine granular structure; very friable; many fine and medium roots; 20 percent rock fragments; neutral; abrupt wavy boundary.

A2—6 to 13 inches; dark brown (10YR 3/3) channery loam, grayish brown (10YR 5/2) dry; weak medium and coarse granular structure; very friable; many fine and medium roots; 20 percent rock fragments; slightly acid; clear wavy boundary.

BA—13 to 21 inches; brown (10YR 4/3) channery loam; weak medium subangular blocky structure parting to weak medium and coarse granular; friable; many medium roots; 25 percent rock fragments; moderately acid; gradual wavy boundary.

Bw1—21 to 30 inches; dark yellowish brown (10YR 4/4) very channery loam; weak medium subangular blocky structure; friable; many medium and coarse roots; few distinct clay films or silt films on faces of peds; 45 percent rock fragments; moderately acid; gradual wavy boundary.

Bw2—30 to 53 inches; yellowish brown (10YR 5/4) very channery loam; weak medium and coarse subangular blocky structure; friable; common medium roots; few distinct clay films or silt films on faces of peds; 55 percent rock fragments; moderately acid; gradual wavy boundary.

C—53 to 65 inches; yellowish brown (10YR 5/4) extremely channery loam; massive; firm; few medium roots; 70 percent rock fragments; strongly acid.

The solum is more than 50 inches thick, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 70 percent, by volume, in individual horizons and averages more than 35 percent, by volume, in the particle-size control section. In unlimed areas the soils are very strongly acid to neutral in the A horizon and very strongly acid to moderately acid in the B and C horizons.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. The fine-earth material is loam.

The BA and Bw horizons have hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. The fine-earth material is loam, sandy loam, or silt loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth material is loam, sandy loam, or silt loam.

Huntington Series

The Huntington series consists of very deep, well drained soils formed in alluvium washed from limy and acid soils on uplands. The Huntington soils are on low flood plains along the Ohio and Big Sandy Rivers. Slope ranges from 0 to 3 percent.

Huntington soils are associated on the landscape with the well drained Ashton, Chagrin, and Kanawha soils and the moderately well drained Cotaco and Lindside soils. Huntington soils have a thicker dark surface layer than that of Chagrin soils, are more frequently flooded than Ashton and Kanawha soils, and are better drained than Cotaco and Lindside soils.

Typical pedon of Huntington silt loam, in a field about 0.9 mile southwest of the intersection of West Virginia County Route 52/71 and U.S. Route 52 and about 260 yards northeast of the confluence of the Big Sandy River and an unnamed branch coming from Belcher Hollow; USGS Prichard topographic quadrangle; lat. 38 degrees 12 minutes 53 seconds N. and long. 82 degrees 36 minutes 09 seconds W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; very friable; many fine roots; moderately acid; abrupt smooth boundary.

AB—10 to 17 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; many fine roots; moderately acid; clear wavy boundary.

Bw1—17 to 24 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; many fine roots; moderately acid; clear wavy boundary.

Bw2—24 to 32 inches; dark yellowish brown (10YR 4/4) silt loam; few fine yellowish red (5YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; common fine roots; few fine very dark grayish brown (10YR 3/2) wormcasts; slightly acid; clear wavy boundary.

BC—32 to 40 inches; dark yellowish brown (10YR 4/4) fine sandy loam; few fine brown (10YR 5/3) and red (2.5YR 4/6) mottles; weak coarse subangular blocky structure; friable; common fine roots; few fine very dark grayish brown (10YR 3/2) wormcasts; slightly acid; gradual wavy boundary.

C1—40 to 46 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; very friable; few fine roots; few fine very dark grayish brown (10YR 3/2) wormcasts; slightly acid; clear wavy boundary.

C2—46 to 65 inches; brown (7.5YR 4/4) and grayish brown (10YR 5/2), stratified fine sandy loam and silt loam; massive; very friable; few fine very dark grayish brown (10YR 3/2) coatings; slightly acid.

The thickness of the solum is 40 to 70 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments is 0 to 3 percent, by volume, in the solum. In unlimed areas the soils are moderately acid to mildly alkaline.

The Ap and AB horizons have hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The fine-earth material is silt loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The fine-earth material is silt loam or silty clay loam.

The BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The fine-earth material is fine sandy loam, silt loam, loam, silty clay loam, or sandy clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The fine-earth material is fine sandy loam, silt loam, loam, silty clay loam, or sandy clay loam or is stratified.

Kanawha Series

The Kanawha series consists of very deep, well drained soils formed in alluvium washed from limy and acid soils on uplands. The Kanawha soils are on high flood plains and low terraces along the Big Sandy River, the Tug Fork of the Big Sandy River, and Twelvepole Creek. Slope ranges from 0 to 8 percent.

Kanawha soils are associated on the landscape with the well drained Allegheny, Chagrin, Grigsby, Huntington, and Nelse soils; the moderately well drained Cotaco, Lobdell, and Markland soils; the somewhat poorly drained Guyan soils; and the poorly drained Melvin soils. Kanawha soils are less frequently flooded than Chagrin, Grigsby, Huntington, and Nelse soils. Allegheny soils are not subject to flooding. Kanawha soils are better drained than Cotaco, Guyan, Lobdell, Markland, and Melvin soils.

Typical pedon of Kanawha loam, 0 to 3 percent slopes, in a corn field about 1.0 mile west-southwest of the confluence of Elijah Creek and the Big Sandy River and about 490 yards southwest of the Christian Cemetery in Prichard; USGS Prichard topographic quadrangle; lat. 38 degrees 14 minutes 30 seconds N. and long. 82 degrees 36 minutes 17 seconds W.

Ap—0 to 9 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; weak medium granular structure; very friable; many roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 25 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common roots; many distinct clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—25 to 40 inches; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; friable; common roots; common clay films on faces of peds; moderately acid; gradual wavy boundary.

BC—40 to 47 inches; yellowish brown (10YR 5/8) sandy loam; weak coarse subangular blocky structure; friable; few roots; moderately acid; clear wavy boundary.

C—47 to 65 inches; yellowish brown (10YR 5/6) and strong brown (7.5YR 4/6), stratified loamy sand

and sandy loam; massive; very friable; moderately acid.

The thickness of the solum is 40 to 72 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 15 percent in the Ap horizon, from 0 to 20 percent in individual subhorizons of the B horizon, and from 0 to 60 percent in the C horizon. In unlimed areas the soils are strongly acid or moderately acid in the upper part of the solum and moderately acid or slightly acid in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. The fine-earth material is loam.

The Bt and BC horizons have hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 8. The fine-earth material is clay loam, loam, silt loam, sandy clay loam, or fine sandy loam.

The C horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 1 to 6 and may have high- and low-chroma mottles. The fine-earth material is sandy loam, loam, or silt loam and in some pedons is stratified with loamy sand.

Latham Series

The Latham series consists of moderately deep, moderately well drained soils formed in acid material weathered from interbedded shale and siltstone. These soils are on ridgetops, benches, and some side slopes throughout the county. Slope ranges from 8 to 35 percent.

Latham soils are associated on the landscape with the well drained Dekalb, Gilpin, Guyandotte, and Pineville soils and the moderately well drained Beech, Buchanan, and Dormont soils. Latham soils are shallower and have more clay in the subsoil than Beech, Buchanan, and Dormont soils and are less well drained than Dekalb, Gilpin, Guyandotte, and Pineville soils.

Typical pedon of Latham silt loam, in an area of Dormont-Latham complex, 15 to 25 percent slopes, in a pasture about 300 yards east-southeast of the intersection of West Virginia State Routes 152 and 37 and about 200 yards southeast of the confluence of Trace Fork and the West Fork of Twelvepole Creek; USGS Wayne topographic quadrangle; lat. 38 degrees 10 minutes 35 seconds N. and long. 82 degrees 28 minutes 35 seconds W.

A—0 to 4 inches; dark brown (10YR 3/3) silt loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium granular structure; very friable; many fine and medium roots; 5 percent rock fragments; neutral; abrupt smooth boundary.

BA—4 to 7 inches; yellowish brown (10YR 5/4) channery silt loam; moderate medium granular structure; friable; many fine and medium roots; 20 percent rock fragments; neutral; clear wavy boundary.

Bt1—7 to 16 inches; yellowish brown (10YR 5/6) channery silty clay loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; many distinct clay films on faces of peds; 15 percent rock fragments; moderately acid; clear smooth boundary.

Bt2—16 to 23 inches; light yellowish brown (2.5Y 6/4) channery silty clay; many fine and medium light gray (2.5Y 7/2) mottles; weak fine and medium subangular and angular blocky structure; firm; common fine roots; many distinct clay films on faces of peds; 25 percent rock fragments; very strongly acid; clear wavy boundary.

Bt3—23 to 29 inches; yellowish brown (10YR 5/6) channery silty clay; many medium and coarse light gray (10YR 7/1) mottles; weak medium subangular blocky structure; firm; few fine roots; few or common distinct clay films on faces of peds; 30 percent rock fragments; very strongly acid; clear wavy boundary.

C—29 to 34 inches; yellowish brown (10YR 5/6) channery silty clay; many medium and coarse light gray (10YR 7/1) mottles; massive; firm; 30 percent rock fragments; very strongly acid; abrupt wavy boundary.

Cr—34 inches; gray (N 5/0 and 10YR 6/1), weathered shale.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The content of rock fragments ranges, by volume, from 0 to 15 percent in the A horizon and from 0 to 30 percent in individual subhorizons of the B and C horizons. In unlimed areas the soils are extremely acid to strongly acid in the A horizon and extremely acid or very strongly acid in the B and C horizons.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. The fine-earth material is silt loam.

The BA horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 8. The fine-earth material is silt loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. The fine-earth material is silty clay or silty clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 6. The fine-earth material is silty clay or silty clay loam.

Lindside Series

The Lindside series consists of very deep, moderately well drained soils formed in alluvium washed from limy and acid soils on uplands. The Lindside soils are on flood plains in urban areas near the Ohio and Big Sandy Rivers. Slope ranges from 0 to 3 percent.

Lindside soils are associated on the landscape with the well drained Ashton, Chagrin, Huntington, and Wheeling soils and the poorly drained Melvin soils. Lindside soils are less well drained than Ashton, Chagrin, Huntington, and Wheeling soils and better drained than Melvin soils.

Typical pedon of Lindside silt loam, in an area of Urban land-Ashton-Lindside complex, 0 to 8 percent slopes, in an open lawn about 0.6 mile southwest of the confluence of Fourpole Creek and the Ohio River and about 40 yards north of the intersection of U.S. Route 60 and Clarendon Court in the Westmoreland section of Huntington; USGS Catlettsburg topographic quadrangle; lat. 38 degrees 24 minutes 07 seconds N. and long. 82 degrees 30 minutes 33 seconds W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; very friable; many fine and medium roots; neutral; clear smooth boundary.

Bw1—9 to 17 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium very pale brown (10YR 7/3) mottles; weak medium subangular blocky structure; friable; common fine roots; neutral; clear wavy boundary.

Bw2—17 to 31 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; common fine roots; moderately acid; clear wavy boundary.

BC—31 to 37 inches; yellowish brown (10YR 5/4) silty clay loam; many medium and coarse light gray (10YR 7/2) mottles; weak medium and coarse subangular blocky structure; friable; few fine roots; common medium black and brown concretions; moderately acid; gradual wavy boundary.

C—37 to 65 inches; dark yellowish brown (10YR 4/6) and light gray (10YR 7/1) silty clay loam; massive; friable; many medium and coarse black and brown concretions; moderately acid.

The thickness of the solum is 25 to 50 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 5 percent to a depth of 40 inches and from 0 to 30 percent below that depth. In unlimed areas the soils are strongly acid to mildly alkaline in the upper part of the solum and moderately acid to mildly alkaline in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. The fine-earth material is silt loam.

The Bw and BC horizons have hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6 above a depth of 20 inches and chroma of 1 to 4 below that depth. The fine-earth material is silty clay loam or silt loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6 (6 to 8 if colors are mixed), and chroma of 1 to 4 . The fine-earth material is silty clay loam, silt loam, loam, very fine sandy loam, fine sandy loam, or sandy loam or is stratified.

Lobdell Series

The Lobdell series consists of very deep, moderately well drained soils formed in alluvium washed from soils on uplands. The Lobdell soils are on flood plains in the northern and central parts of the county. Slope ranges from 0 to 3 percent.

Lobdell soils are associated on the landscape with the well drained Allegheny, Chagrin, Grigsby, and Kanawha soils; the moderately well drained Beech and Cotaco soils; and the somewhat poorly drained Guyan soils. Lobdell soils are more frequently flooded than Cotaco soils. Beech soils are not subject to flooding. Lobdell soils are less well drained than Allegheny, Chagrin, Grigsby, and Kanawha soils and better drained than Guyan soils.

Typical pedon of Lobdell loam, in a pasture near Whites Creek, about 640 yards from the intersection of West Virginia County Routes 14 and 19 and about 90 yards northwest of the confluence of Sours Run and Whites Creek; USGS Burnaugh topographic quadrangle; lat. 38 degrees 17 minutes 28 seconds N. and long. 82 degrees 32 minutes 07 seconds W.

Ap—0 to 6 inches; brown (10YR 4/3) loam; weak medium subangular blocky structure parting to weak fine and medium granular; friable; many fine and medium roots; 5 percent rock fragments; slightly acid; clear wavy boundary.

Bw1—6 to 20 inches; dark yellowish brown (10YR 4/4) loam; weak medium and coarse subangular blocky structure; friable; common fine and medium roots; neutral; gradual wavy boundary.

Bw2—20 to 38 inches; dark yellowish brown (10YR 4/4) loam; common medium light brownish gray (10YR 6/2) mottles; weak medium and coarse subangular blocky structure; friable; common fine roots; neutral; gradual wavy boundary.

C—38 to 65 inches; dark yellowish brown (10YR 4/6), stratified silt loam and loam; many medium light brownish gray (10YR 6/2) mottles; massive; friable; many fine and medium iron and manganese concretions; neutral.

The thickness of the solum is 24 to 50 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 5 percent in the A horizon and from 0 to 15 percent in the B and C horizons. In unlimed areas the soils are strongly acid to neutral in the A and B horizons and moderately acid to neutral in the C horizon.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. The fine-earth material is loam.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. The fine-earth material is loam, silt loam, silty clay loam, clay loam, fine sandy loam, or sandy loam.

The C horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 to 8. The fine-earth material is silt loam, loam, or sandy loam or is stratified.

Markland Series

The Markland series consists of very deep, moderately well drained soils formed in slack-water alluvium washed from soils on uplands. The Markland soils are on low terraces along Whites Creek and the northern part of Twelvepole Creek.

Markland soils are associated on the landscape with the well drained Grigsby and Kanawha soils, the moderately well drained Beech and Cotaco soils, and the somewhat poorly drained Guyan soils. Markland soils have more clay in the subsoil than Beech and Cotaco soils and are less well drained than Grigsby and Kanawha soils and better drained than Guyan soils.

Typical pedon of Markland silt loam, 3 to 8 percent slopes, in a hay field about 1.0 mile east of the intersection of U.S. Route 52 and West Virginia County Route 19 and about 1.5 miles northwest of the confluence of Sours Run and Whites Creek; USGS Burnaugh topographic quadrangle; lat. 38 degrees 18 minutes 22 seconds N. and long. 82 degrees 33 minutes 18 seconds W.

Ap—0 to 8 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; many fine roots; moderately acid; abrupt smooth boundary.

Bt1—8 to 18 inches; light olive brown (2.5Y 5/6) silty clay loam; weak medium subangular blocky structure; friable; common distinct clay films on faces of peds; many fine roots; strongly acid; clear smooth boundary.

2Bt2—18 to 24 inches; light olive brown (2.5Y 5/4) silty clay; common medium light gray (5YR 7/1) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; common fine roots; many distinct clay films on faces of peds and in root pores; slightly acid; gradual wavy boundary.

2Bt3—24 to 34 inches; light olive brown (2.5Y 5/4) silty clay; many fine and medium gray (5Y 6/1) mottles; light brownish gray (2.5Y 6/2) coatings on faces of peds; weak medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many distinct clay films on faces of peds and in root pores; neutral; gradual wavy boundary.

2BC—34 to 39 inches; light olive brown (2.5Y 5/4) silty clay; many fine and medium gray (5Y 6/1) mottles; grayish brown (2.5Y 5/2) coatings on faces of peds; weak medium and coarse prismatic structure parting to weak medium and coarse angular blocky; firm; few fine roots; mildly alkaline; gradual wavy boundary.

2C—39 to 65 inches; light olive brown (2.5Y 5/4) silty clay; many fine gray (N 6/0) mottles; massive; firm; moderately alkaline.

The thickness of the solum is 20 to 40 inches, and the depth to bedrock is more than 60 inches. The soils commonly have no rock fragments. In unlimed areas the soils are moderately acid to neutral in the Ap horizon, slightly acid or neutral in the 2Bt horizon, and mildly alkaline or moderately alkaline in the 2C horizon.

The Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. The fine-earth material is silt loam.

The Bt, 2Bt, and 2BC horizons have hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. The fine-earth material is silty clay loam, silty clay, or clay.

The 2C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. The fine-earth material is silty clay, clay, or clay loam or is stratified.

Melvin Series

The Melvin series consists of very deep, poorly drained soils formed in alluvium washed from soils on uplands. The Melvin soils are in depressions on flood plains along the major drainageways throughout the county. Slope ranges from 0 to 3 percent.

Melvin soils are associated on the landscape with the well drained Ashton, Chagrin, Grigsby, Kanawha, and Wheeling soils; the moderately well drained Cotaco and Lindside soils; and the somewhat poorly drained Guyan soils. Melvin soils are less well drained than all of these soils.

Typical pedon of Melvin silt loam, in an abandoned field about 0.7 mile southwest of the intersection of U.S. Route 52 and West Virginia State Route 75 and about 2.0 miles north-northwest of the confluence of Dock Creek and the Big Sandy River; USGS Burnaugh topographic quadrangle; lat. 38 degrees 21 minutes 48 seconds N. and long. 82 degrees 35 minutes 38 seconds W.

Ap—0 to 6 inches; dark grayish brown (2.5Y 4/2) silt loam; weak fine and medium granular structure; very friable; many fine and medium roots; moderately acid; clear wavy boundary.

BAg—6 to 10 inches; grayish brown (2.5Y 5/2) silt loam; weak medium subangular blocky structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bg1—10 to 15 inches; gray (10YR 6/1) silt loam; common fine yellowish brown (10YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; common fine roots; few fine concretions; moderately acid; clear wavy boundary.

Bg2—15 to 22 inches; light gray (2.5Y 7/2) silty clay loam; many fine and medium brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; many medium concretions; moderately acid; clear wavy boundary.

Cg—22 to 65 inches; light gray (10YR 7/1) silty clay loam; many coarse strong brown (7.5YR 5/8) mottles; massive; firm; many concretions; moderately acid.

The thickness of the solum is 20 to 40 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 5 percent to a depth of 30 inches and from 0 to 20 percent below that depth. In unlimed areas the soils are moderately acid to mildly alkaline.

The Ap horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 4. The fine-earth material is silt loam.

The BAg and Bg horizons have hue of 10YR to 5Y or are neutral in hue. They have value of 4 to 7 and chroma of 2 or less. They have mottles in shades of brown or red. The fine-earth material is silt loam or silty clay loam.

The Cg horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 4 to 7 and chroma of 2 or less. It has mottles in shades of brown or red. The fine-earth material is silty clay loam, silt loam, or loam or, below a depth of 40 inches, is stratified.

Nelse Series

The Nelse series consists of very deep, well drained soils formed in recent alluvium washed from soils on uplands. The Nelse soils are on the gently sloping to moderately steep banks of major streams, especially the Big Sandy River and the Tug Fork of the Big Sandy River. Slope ranges from 3 to 25 percent.

Nelse soils are associated on the landscape with the well drained Grigsby and Kanawha soils and the moderately well drained Cotaco soils. Nelse soils have a thicker dark surface layer than that of Grigsby soils and are on much steeper slopes. They are sandier than Kanawha soils and better drained than Cotaco soils.

Typical pedon of Nelse silt loam, 3 to 25 percent slopes, in a forest about 1,800 feet northwest of Christian Cemetery on a north-facing point on the banks of the Big Sandy River opposite the confluence of Rush Creek (in Kentucky) and the Big Sandy River; USGS Prichard topographic quadrangle; lat. 38 degrees 14 minutes 47 seconds N. and long. 82 degrees 36 minutes 17 seconds W.

A—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium subangular blocky structure; very friable; common very fine and fine roots; slightly acid; abrupt smooth boundary.

C1—11 to 29 inches; olive brown (2.5Y 4/3) loamy fine sand; massive; loose; few fine and medium roots; slightly acid; gradual irregular boundary.

C2—29 to 36 inches; yellowish brown (10YR 5/4) loamy fine sand; massive; loose; few fine roots; slightly acid; abrupt smooth boundary.

C3—36 to 55 inches; brown (10YR 4/3) loamy sand; common medium dark reddish brown (5YR 3/2) and dark yellowish brown (10YR 4/6) mottles; massive; very friable; few very fine and fine roots; slightly acid; clear wavy boundary.

C4—55 to 65 inches; yellowish brown (10YR 5/4) loamy sand; few medium dark gray (10YR 4/1) mottles; massive; loose; few very fine, fine, and medium roots; slightly acid.

The thickness of the soils ranges from 60 to 80 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 15 percent, by volume. The content of coal fragments ranges from 0 to 15 percent, by volume, throughout the profile. In unlimed areas the soils are strongly acid to moderately alkaline.

The A horizon has hue of 10YR or 2.5Y and value and chroma of 2 to 4. The fine-earth material is silt loam.

The C horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 2 to 6. The fine-earth material is loamy fine sand, loamy sand, silt loam, loam, fine sandy loam, or sandy loam or is stratified.

Pineville Series

The Pineville series consists of very deep, well drained soils formed in mixed colluvium derived from sandstone, shale, and siltstone. These soils are on foot slopes, on the lower side slopes, and in coves in the southern half of the county. Slope ranges from 15 to 65 percent.

Pineville soils are associated on the landscape with the somewhat excessively drained Fiveblock soils; the well drained Dekalb, Gilpin, and Guyandotte soils; and the moderately well drained Buchanan, Dormont, and Latham soils. Pineville soils have a lower content of rock fragments in the subsoil than Dekalb, Fiveblock, and Guyandotte soils; are deeper than Gilpin soils; and are better drained than Buchanan, Dormont, and Latham soils.

Typical pedon of Pineville channery loam, in an area of Pineville and Buchanan channery loams, 15 to 35 percent slopes, extremely stony, in a forest about 0.6 mile southwest of the confluence of Gourd Branch and the West Fork of Twelvepole Creek and about 0.7 mile west-northwest of the intersection of West Virginia County Routes 41 and 41/1; USGS Wilsondale topographic quadrangle; lat. 37 degrees 57 minutes 36 seconds N. and long. 82 degrees 21 minutes 09 seconds W.

Oi—1 inch to 0; hardwood leaf litter.

A—0 to 5 inches; dark brown (10YR 3/3) channery loam, brown (10YR 5/3) dry; weak fine and medium granular structure; very friable; many fine and medium roots; 25 percent rock fragments; strongly acid; abrupt wavy boundary.

BA—5 to 14 inches; light yellowish brown (10YR 6/4) channery loam; weak fine and medium subangular blocky structure; friable; many fine roots; 25 percent rock fragments; strongly acid; gradual wavy boundary.

Bt1—14 to 28 inches; reddish yellow (7.5YR 6/6) channery loam; weak fine and medium subangular blocky structure; friable; common fine roots; common distinct clay films on faces of peds; 25 percent rock fragments; strongly acid; gradual wavy boundary.

Bt2—28 to 43 inches; yellowish brown (10YR 5/6) channery loam; weak medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; 30 percent rock fragments; strongly acid; gradual wavy boundary.

BC—43 to 53 inches; yellowish brown (10YR 5/6) channery loam; weak coarse subangular blocky structure; firm; few fine roots; 30 percent rock fragments; very strongly acid; gradual wavy boundary.

C—53 to 65 inches; yellowish brown (10YR 5/6) very channery loam; common medium light gray (2.5Y 7/2) mottles; massive; friable; many medium concretions; 35 percent rock fragments; very strongly acid.

The thickness of the solum is 40 to 60 inches, and the depth to bedrock is more than 72 inches. The content of rock fragments ranges from 10 to 60 percent, by volume, in individual horizons and averages 15 to 35 percent, by volume, in the control section. In unlimed areas the soils are extremely acid to neutral in the A horizon and extremely acid to strongly acid in the B and C horizons.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. The fine-earth material is loam.

The BA, Bt, and BC horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. The fine-earth material is loam, clay loam, or sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. The fine-earth material is loam, clay loam, or sandy loam.

Udorthents

Udorthents consist of well drained soils that are made up of soil material and rock fragments and have been disturbed by human activities. The depth of the soils varies. The soils are along highways and railroads, on construction sites and mine sites, and in other developed areas that have been excavated and/or filled. They are throughout the county. Slope ranges from 0 percent in some areas to nearly vertical in cuts.

Udorthents are associated with all soils on any landscape in the county.

A typical pedon for Udorthents is not given because of the variability of these soils. The depth to bedrock is generally more than 40 inches. Rock fragments of shale, siltstone, or sandstone vary in size and amount. The soils have hue of 2.5YR to 5Y, value of 1 to 7, and chroma of 1 to 8. The fine-earth material varies in texture or is stratified. In unlimed areas the soils are extremely acid to moderately alkaline.

Upshur Series

The Upshur series consists of deep, well drained soils formed in limy material weathered from shale. These soils are on ridgetops, benches, and side slopes in the northern third of the county. Slope ranges from 8 to 65 percent.

Upshur soils are associated on the landscape with the well drained Allegheny and Gilpin soils and the moderately well drained Beech soils. Upshur soils have more clay in the subsoil than Allegheny and Gilpin soils and are better drained than Beech soils.

Typical pedon of Upshur silt loam, in an area of Gilpin-Upshur complex, 15 to 25 percent slopes, in a forest about 0.9 mile north-northwest of the confluence of Atkins Branch and Fisher Bowen Branch and about 0.8 mile north of the intersection of West Virginia County Routes 17 and 13/2; USGS Winslow topographic quadrangle; lat. 38 degrees 17 minutes 03 seconds N. and long. 82 degrees 22 minutes 01 second W.

0i—2 inches to 0; leaf litter.

A—0 to 4 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; very friable; many medium roots; 5 percent rock fragments; strongly acid; clear smooth boundary.

BA—4 to 8 inches; brown (7.5YR 5/4) silt loam; weak fine and medium subangular blocky structure; friable; many medium and coarse roots; 5 percent rock fragments; strongly acid; clear smooth boundary.

Bt1—8 to 18 inches; reddish brown (2.5YR 4/4) clay; moderate fine and medium subangular blocky structure; firm; many fine and medium roots; many prominent clay films on faces of peds; 5 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—18 to 28 inches; dark reddish brown (2.5YR 3/4) channery clay; moderate fine and medium angular blocky structure; firm; common fine and medium roots; many clay films on faces of peds; 15 percent shale fragments; strongly acid; gradual wavy boundary.

BC—28 to 40 inches; weak red (10R 4/3) channery clay; weak medium subangular blocky structure; firm; few fine roots; 20 percent shale fragments; strongly acid; clear smooth boundary.

C—40 to 45 inches; dusky red (10R 3/3) very channery clay; massive; firm; 50 percent shale fragments; moderately acid; abrupt smooth boundary.

Cr—45 inches; weathered shale bedrock.

The thickness of the solum is 26 to 50 inches, and the depth to bedrock is 40 to 60 inches. The content of rock fragments ranges, by volume, from 0 to 15 percent in the A and Bt1 horizons, from 0 to 25 percent in the Bt2 and BC horizons, and from 0 to 75 percent in the C horizon. In unlimed areas the soils are very strongly acid to slightly acid in the A horizon, very strongly acid to moderately acid in the Bt and BC horizons, and strongly acid to moderately alkaline in the C horizon.

The A horizon has hue of 2.5YR to 10YR and value and chroma of 2 to 4. The fine-earth material is silt loam.

The BA horizon has hue of 5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6. The fine-earth material is silt loam.

The Bt horizon has hue of 10R to 5YR, value of 3 or 4, and chroma of 3 to 6. The fine-earth material is clay or silty clay.

The BC horizon has hue of 10R to 5YR, value of 3 or 4, and chroma of 3 to 6. The fine-earth material is clay, silty clay, or silty clay loam.

The C horizon has hue of 10R to 5YR, value of 3 or 4, and chroma of 3 to 6. The fine-earth material is clay, silty clay, silty clay loam, silt loam, or clay loam.

Wheeling Series

The Wheeling series consists of very deep, well drained soils formed in alluvium washed from soils on uplands. The Wheeling soils are on low terraces in urban areas near the Ohio River. Slope ranges from 0 to 8 percent.

Wheeling soils are associated on the landscape with the well drained Ashton and Chagrin soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. Wheeling soils have more sand in the subsoil than Ashton soils; are higher on the landscape and more sloping than Chagrin soils; and are better drained than Lindside and Melvin soils.

Typical pedon of Wheeling loam, in an area of Urban land-Wheeling complex, 0 to 8 percent slopes, in a lawn in Kenova about 1.5 miles southeast of the confluence of the Big Sandy River and the Ohio River and about 260 yards south of the intersection of West Virginia State Route 75 and U.S. Route 60; USGS

Catlettsburg topographic quadrangle; lat. 38 degrees 23 minutes 56 seconds N. and long. 82 degrees 34 minutes 42 seconds W.

Ap—0 to 8 inches; dark brown (10YR 3/3) loam, light yellowish brown (10YR 6/4) dry; weak fine and medium granular structure; very friable; many fine and medium roots; moderately acid; clear smooth boundary.

BA—8 to 12 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable or firm; many fine and medium roots; moderately acid; clear smooth boundary.

Bt1—12 to 32 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—32 to 42 inches; dark yellowish brown (10YR 4/6) loam; weak medium subangular blocky structure; friable; common fine roots; common clay films on faces of peds; moderately acid; clear wavy boundary.

BC—42 to 49 inches; dark yellowish brown (10YR 4/6) sandy loam; weak coarse subangular blocky structure; friable; few fine roots; strongly acid; gradual wavy boundary.

C—49 to 65 inches; yellowish brown (10YR 5/4), stratified loamy sand and sandy loam; massive; very friable; strongly acid.

The solum is more than 40 inches thick, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 35 percent, by volume. In unlimed areas the soils are strongly acid or moderately acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. The fine-earth material is loam.

The BA horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth material is loam or silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth material is loam, silt loam, clay loam, or silty clay loam.

The BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth material is sandy loam or very fine sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The fine-earth material ranges from very fine sand to loam and is stratified.

Formation of the Soils

This section explains the origin and development of the soils in Wayne County. It describes the influence of the five factors of soil formation on the soils in the county. It also describes the morphology of the soils as it applies to horizonization and the processes involved in the development of soil horizons.

Factors of Soil Formation

The soils in Wayne County have resulted from the interaction of five major factors of soil formation—parent material, time, climate, living organisms, and topography (Buol et al., 1973). These factors are interrelated. Parent material, topography, and time have produced the major differences among the soils in Wayne County. Climate and living organisms generally show their influence throughout broad areas, and their effects are not significantly different county-wide.

Parent Material, Time, and Climate

The characteristics of the parent material strongly influence the time required for soil formation and the nature of the soil produced. The soils in the county formed in residual, colluvial, alluvial, and eolian materials.

Most of the soils formed in residual material weathered from interbedded shale, siltstone, and sandstone. For example, Gilpin soils formed in material weathered from interbedded shale, siltstone, and fine grained sandstone. Dekalb soils formed in material weathered from sandstone, and Upshur soils formed in material weathered from calcareous shale.

The residual material is the oldest parent material in the county. Many of the soils that formed in residual material, however, are not so well developed as some soils that formed in younger material because the soil-forming processes have been hindered in many areas by resistant rock, slope, aspect, and erosion.

The colluvial parent material on foot slopes, in coves, and near the head of drainageways has moved downslope from residual soils or from higher lying colluvial soils. For example, Beech soils formed in colluvium below areas of Upshur soils, and Buchanan soils formed in colluvium below areas of Dekalb and Pineville soils.

The alluvial parent material on terraces has washed from soils on uplands. The soil-forming processes have had considerable time to act on this material. Many additions, losses, and alterations have taken place. The resulting soils are strongly leached and have a moderately well developed profile. Examples are Allegheny and Wheeling soils.

Some of the terraces in the northern part of the county formed in lacustrine deposits. These deposits were laid down when glacial ice blocked the Ohio River. The deposits consist of alkaline silt and clay overlain by a thin layer of eolian silt or loess. The lacustrine deposits with their loess “caps” probably covered a more extensive area in the past, but later erosion and/or deposition destroyed or buried these deposits.

Most of the soils that formed in alluvial material on flood plains are poorly developed because the soil-forming processes have had little time to act. Chagrin, Grigsby, and Lobdell soils are examples of such soils.

Climate generally is uniform throughout the county. There are slight climatic differences between the northern and southern extremes of the county, but these differences are not significant enough to affect soil formation. Therefore, climate is not responsible for major differences among the soils in the county. Rainfall and temperature, however, have had a general influence on the development of layers in the soil profile. The section “General Nature of the County” gives a detailed description of the climate.

Living Organisms

Many living organisms affect soil formation. The type of vegetation is generally responsible for the amount of organic matter and nutrients in the soil. Earthworms and burrowing animals help to keep the soil open and porous by mixing and moving the soil material. Some bacteria and fungi decompose organic matter and can be instrumental in releasing nutrients for plant uptake. Humans influence the characteristics of the surface layer of soils by clearing vegetation, plowing, mining, or otherwise disturbing the soils.

Additionally, humans have added fertilizer and lime and have used other management techniques to improve the tilth and productivity of the surface layer (Brady, 1974).

Topography

Topography affects soil formation primarily through its effect on the amount of water moving through the soil, the amount and rate of runoff, and the rate of erosion. Large amounts of water have moved through gently sloping to strongly sloping soils. Water may percolate freely through these soils. On the steep and very steep side slopes, less water moves through the soils and the amount and rate of runoff are greater. If left unprotected, the soil material can be eroded away as rapidly as a soil forms. Thus, it is likely that the soils on the steeper side slopes will be more shallow to bedrock than the soils on the more gentle slopes.

Morphology of the Soils

The results of the soil-forming processes can be observed in the different layers, or horizons, of the soil profile. The profile extends from the surface downward to materials that are relatively unaltered by the soil-forming processes. Most soils have three major horizons, called the A, B, and C horizons. These horizons can be further subdivided by the use of numbers and letters that indicate differences within a major horizon.

The A horizon is the surface layer. It has the maximum accumulation of organic matter and is also the layer of maximum leaching, or eluviation, of clay minerals and iron and aluminum oxides.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay minerals, iron and aluminum oxides, and other compounds. These may have been leached from the surface layer or may have formed in place. The B horizon commonly has blocky structure and is generally firmer and lighter in color than the A horizon.

The C horizon is below the A and B horizons. It consists of material that has been modified by weathering but is relatively unchanged by the soil-forming processes.

In Wayne County many processes are involved in the formation of soil horizons. Some of the more important processes are the accumulation of organic matter, the reduction and transfer of iron oxides, the formation and translocation of clay minerals, and the formation of soil structure. Such processes continue to take place today as they have for thousands of years.

Most of the well drained soils on uplands in the county have a yellowish brown or weak red B horizon. These colors are caused mainly by the presence of iron oxides. The B horizon in these soils has blocky structure and commonly contains translocated clay minerals.

A fragipan has formed in the B horizon of the moderately well drained Buchanan soils on foot slopes. This layer is dense and brittle, mottled in color, and slowly or very slowly permeable to water and air. Most fragipans are gray or mottled with gray.

Many of the soils in the county, such as Buchanan soils, have gray colors that are the result of the reduction and leaching of iron oxides during soil formation. These soils are moderately well drained, somewhat poorly drained, or poorly drained.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or is in areas that have been disturbed by mining or construction.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as:

Ver low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material that is intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The subdivisions are described in the "Soil Survey Manual." The major horizons of mineral soil are:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Lithochromic mottles. Mottles that have inherited their color from the rocks that made up the parent material of the soil.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesophytic crops. Crops that grow under medium moisture conditions. Contrast with hydrophytic plants, which thrive under wet conditions.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic features. Redoximorphic concentrations and depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth’s surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated by a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Site preparation (woodland). Land treatment that encourages natural seeding of desirable trees or permits reforestation by planting or by direct seeding.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of rock fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1963-81 at Wayne, West Virginia)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	37.8	17.1	27.5	69	-10	51	2.84	1.09	4.29	6	10.3
February----	45.0	20.2	32.6	75	-5	76	2.53	1.27	3.62	6	5.0
March-------	59.5	31.3	45.4	85	10	209	3.06	1.76	4.21	7	1.2
April-------	70.6	40.3	55.5	90	22	465	4.16	2.57	5.57	7	.0
May---------	77.9	48.8	63.4	92	29	725	3.76	1.76	5.47	8	.0
June--------	84.6	56.8	70.7	95	39	921	2.88	1.65	3.98	5	.0
July--------	87.2	62.1	74.7	97	49	1,076	5.13	3.13	6.93	8	.0
August------	85.9	61.9	73.9	95	47	1,051	3.68	2.01	5.15	7	.0
September---	81.2	55.4	68.3	92	36	849	3.06	1.45	4.44	5	.0
October-----	68.9	40.3	54.6	86	22	453	3.00	1.96	3.94	7	.0
November----	57.0	32.5	44.8	78	9	188	2.53	1.30	3.59	6	.7
December----	46.1	25.3	35.7	74	4	90	3.28	1.36	4.90	7	1.1
Yearly:											
Average---	66.8	41.0	53.9	---	---	---	---	---	---	---	---
Extreme---	---	---	---	96	-17	---	---	---	---	---	---
Total-----	---	---	---	---	---	6,154	39.91	34.39	45.47	79	18.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1963-81 at Wayne, West Virginia)

Probability	Temperature		
	24 ^{o}F or lower	28 ^{o}F or lower	32 ^{o}F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 16	Apr. 30	May 16
2 years in 10 later than--	Apr. 10	Apr. 24	May 11
5 years in 10 later than--	Mar. 30	Apr. 13	May 1
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 16	Oct. 5	Sep. 29
2 years in 10 earlier than--	Oct. 24	Oct. 12	Oct. 3
5 years in 10 earlier than--	Nov. 7	Oct. 26	Oct. 11

Table 3.--Growing Season

(Recorded in the period 1963-81 at Wayne, West Virginia)

Probability	Daily minimum temperature during growing season		
	Higher than 24 ^{o}F	Higher than 28 ^{o}F	Higher than 32 ^{o}F
	Days	Days	Days
9 years in 10	190	168	145
8 years in 10	201	177	151
5 years in 10	223	196	163
2 years in 10	247	216	176
1 year in 10	264	230	185

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AgC	Allegheny loam, bedrock substratum, 8 to 15 percent slopes	1,110	0.3
AsA	Ashton silt loam	285	*
BeC	Beech loam, 8 to 15 percent slopes	1,405	0.4
BeD	Beech loam, 15 to 25 percent slopes	11,410	3.5
BeE	Beech loam, 25 to 35 percent slopes	6,430	2.0
BuC	Beech-Urban land complex, 3 to 15 percent slopes	1,165	0.4
Ca	Chagrin silt loam	2,590	0.8
CtA	Cotaco loam, 0 to 3 percent slopes	520	0.2
CtB	Cotaco loam, 3 to 8 percent slopes	1,450	0.4
DgF	Dekalb-Gilpin complex, 35 to 65 percent slopes, very stony	86,470	26.4
DlE	Dekalb-Latham complex, 25 to 35 percent slopes	18,915	5.8
DPG	Dekalb-Pineville-Guyandotte association, very steep, extremely stony	43,015	13.1
DrD	Dormont-Latham complex, 15 to 25 percent slopes	8,095	2.5
DrE	Dormont-Latham complex, 25 to 35 percent slopes	30,195	9.2
FvF	Fiveblock channery sandy loam, very steep, very stony	1,520	0.5
GuC	Gilpin-Upshur complex, 8 to 15 percent slopes	1,450	0.4
GuD	Gilpin-Upshur complex, 15 to 25 percent slopes	17,615	5.4
GuE	Gilpin-Upshur complex, 25 to 35 percent slopes	14,120	4.3
GuF	Gilpin-Upshur complex, 35 to 65 percent slopes	23,865	7.3
Gw	Grigsby loam	5,470	1.7
Gy	Guyan silt loam	550	0.2
Hu	Huntington silt loam	420	0.1
KaA	Kanawha loam, 0 to 3 percent slopes	890	0.3
KaB	Kanawha loam, 3 to 8 percent slopes	630	0.2
LgC	Latham-Gilpin complex, 8 to 15 percent slopes	1,815	0.6
LgD	Latham-Gilpin complex, 15 to 25 percent slopes	17,060	5.2
Lo	Lobdell loam	6,335	1.9
MaB	Markland silt loam, 3 to 8 percent slopes	180	*
MaC	Markland silt loam, 8 to 15 percent slopes	360	0.1
Me	Melvin silt loam	130	*
NeD	Nelse silt loam, 3 to 25 percent slopes	825	0.3
PbE	Pineville and Buchanan channery loams, 15 to 35 percent slopes, extremely stony	9,025	2.8
Ud	Udorthents, smoothed	4,490	1.3
UsB	Urban land-Ashton-Lindside complex, 0 to 8 percent slopes	1,205	0.4
UtD	Urban land-Gilpin-Upshur complex, 15 to 25 percent slopes	755	0.2
UvB	Urban land-Kanawha-Cotaco complex, 0 to 8 percent slopes	1,150	0.4
UwB	Urban land-Wheeling complex, 3 to 8 percent slopes	210	*
	Water	4,775	1.4
	Total	327,900	100.0

* Less than 0.1 percent.

Table 5.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland.)

Map symbol	Soil name
AsA	Ashton silt loam
Ca	Chagrin silt loam
CtA	Cotaco loam, 0 to 3 percent slopes
Gw	Grigsby loam
Hu	Huntington silt loam
KaA	Kanawha loam, 0 to 3 percent slopes
KaB	Kanawha loam, 3 to 8 percent slopes
Lo	Lobdell loam

Table 6.--Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Soil name and map symbol	Land capability	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass	Tobacco
		Bu	Bu	Bu	Tons	Tons	AUM*	Lbs
AgC------------- Allegheny	IIIe	105	70	40	3.5	4.0	4.5	2,700
AsA------------- Ashton	I	135	80	50	5.0	5.5	5.5	3,100
BeC------------- Beech	IIIe	90	60	35	3.0	3.5	4.5	---
BeD------------- Beech	IVe	80	55	35	2.5	3.0	4.0	---
BeE------------- Beech	VIe	---	---	---	---	---	3.5	---
BuC. Beech-Urban land								
Ca-------------- Chagrin	IIw	125	75	45	4.5	5.0	5.5	---
CtA------------- Cotaco	IIw	110	65	35	3.0	---	---	2,400
CtB------------- Cotaco	IIe	110	65	35	3.0	3.5	4.5	2,400
DgF------------- Dekalb-Gilpin	VIIs	---	---	---	---	---	---	---
DlE------------- Dekalb-Latham	VIe	---	---	---	---	---	2.5	---
DPG------------- Dekalb-Pineville-Guyandotte	VIIs	---	---	---	---	---	---	---
DrD------------- Dormont-Latham	IVe	80	35	35	2.5	2.5	3.5	---
DrE------------- Dormont-Latham	VIe	---	---	---	---	---	3.0	---
FvF------------- Fiveblock	VIIs	---	---	---	---	---	---	---
GuC------------- Gilpin-Upshur	IIIe	90	60	35	3.0	3.5	4.5	2,300
GuD------------- Gilpin-Upshur	IVe	85	55	30	2.5	3.0	4.0	---
GuE------------- Gilpin-Upshur	VIe	---	---	---	---	---	3.5	---

See footnote at end of table.

Table 6.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass	Tobacco
		Bu	Bu	Bu	Tons	Tons	AUM*	Lbs
GuF------------- Gilpin-Upshur	VIIe	---	---	---	---	---	---	---
Gw-------------- Grigsby	IIw	130	---	40	4.0	---	---	3,000
Gy-------------- Guyan	IIIw	105	75	---	3.5	---	4.5	---
Hu-------------- Huntington	IIw	130	80	50	3.5	5.0	5.5	3,200
KaA------------- Kanawha	I	135	80	50	3.5	5.0	5.5	3,000
KaB------------- Kanawha	IIe	130	80	50	3.5	5.0	5.5	3,000
LgC------------- Latham-Gilpin	IVe	85	50	30	3.0	3.0	3.5	---
LgD------------- Latham-Gilpin	VIe	---	---	---	---	---	3.0	---
Lo-------------- Lobdell	IIw	125	80	40	3.5	4.5	5.5	2,400
MaB------------- Markland	IIe	80	60	35	2.5	3.0	4.0	---
MaC------------- Markland	IIIe	70	55	30	2.5	3.0	4.0	---
Me-------------- Melvin	IIIw	80	60	---	3.5	---	4.5	---
NeD------------- Nelse	VIe	---	---	---	3.0	---	---	---
PbE------------- Pineville and Buchanan	VIIs	---	---	---	---	---	---	---
Ud. Udorthents								
UsB. Urban land-Ashton-Lindside								
UtD. Urban land-Gilpin-Upshur								
UvB. Urban land-Kanawha-Cotaco								

See footnote at end of table.

Table 6.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass	Tobacco
		Bu	Bu	Bu	Tons	Tons	AUM*	Lbs
UwB. Urban land-Wheeling								

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Table 7.--Capability Classes and Subclasses

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage.)

Class	Total acreage	Major management concerns (Subclass): Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	1,175	---	---	---
II	17,595	2,260	15,335	---
III	5,005	4,325	680	---
IV	38,935	38,935	---	---
V	---	---	---	---
VI	87,545	87,545	---	---
VII	163,895	23,865	---	140,030
VIII	---	---	---	---

Table 8.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available. For map units having slopes of more than 15 percent, site index is given for north aspects. Site index on south aspects will generally be 5 to 10 points lower.)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Average annual growth*		
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Cubic feet/ac	Board feet/ac	Cords/ac
AgC: Allegheny	4A	Slight	Slight	Slight	Moderate	Black oak	78	60	236	0.78
						Shortleaf pine	80	130	---	---
						Yellow-poplar	93	95	482	1.10
						Sugar maple	---	---	---	---
						White ash	---	---	---	---
						Northern red oak	---	---	---	---
						Red maple	---	---	---	---
						Pignut hickory	---	---	---	---
						White oak	70	52	180	.67
						Black cherry	---	---	---	---
AsA: Ashton	5A	Slight	Slight	Slight	Severe	Northern red oak	85	67	285	.90
						Sweetgum	87	98	---	---
						Hackberry	---	---	---	---
						Hickory	---	---	---	---
						Yellow-poplar	95	98	510	1.0
						Red maple	---	---	---	---
						White ash	---	---	---	---
						American sycamore	---	---	---	---
						American elm	---	---	---	---
						Cherrybark oak	---	---	---	---
						White oak	---	---	---	---
BeC: Beech	4A	Slight	Slight	Slight	Severe	Northern red oak	80	62	250	.81
						Yellow-poplar	95	98	510	1.14
						Shortleaf pine	80	130	---	---
BeD, BeE: Beech	5R	Moderate	Moderate	Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	102	110	608	1.27
						Shortleaf pine	85	140	---	---
Ca: Chagrin	5A	Slight	Slight	Slight	Severe	Northern red oak	86	68	292	.89
						Yellow-poplar	96	100	524	1.15
						Sugar maple	86	53	---	---
						White oak	---	---	---	---
						Black cherry	---	---	---	---
						White ash	---	---	---	---
						Black walnut	---	---	---	---
CtA, CtB: Cotaco	4A	Slight	Slight	Slight	Moderate	Black oak	80	62	250	.81
						Yellow-poplar	97	105	538	1.17
						Sweet birch	---	---	---	---
DgF:										
Dekalb	3R	Moderate	Severe	Moderate	Slight	Northern red oak	55	38	85	.45
						Yellow-poplar	---	---	---	---
						Chestnut oak	---	---	---	---
						Red maple	---	---	---	---
Gilpin	4R	Severe	Severe	Slight	Moderate	Northern red oak	80	---	---	---
						Yellow-poplar	95	---	---	---

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/ac	Board feet/ac	Cords/ac
DlE:										
Dekalb	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak	55	38	85	0.45
						Yellow-poplar	---	---	---	---
						Red maple	---	---	---	---
						Chestnut oak	---	---	---	---
Latham	3R	Moderate	Severe	Severe	Moderate	Northern red oak	65	48	145	.60
						Black oak	75	57	215	.74
						White oak	75	57	215	.74
						Shortleaf pine	---	---	---	---
DPG:										
Dekalb	3R	Severe	Severe	Moderate	Moderate	Northern red oak	55	38	85	.45
						Yellow-poplar	---	---	---	---
						Chestnut oak	---	---	---	---
						Red maple	---	---	---	---
Pineville	5R	Severe	Severe	Moderate	Severe	Northern red oak	86	68	292	.89
						Yellow-poplar	108	121	692	1.38
						Black oak	85	67	285	.88
						Basswood	---	---	---	---
						Hickory	---	---	---	---
Guyandotte	5R	Severe	Severe	Severe	Severe	Northern red oak	85	67	285	.88
						American basswood	99	---	---	---
						Yellow-poplar	104	114	636	1.31
						Black cherry	86	53	---	---
						Black locust	85	---	---	---
DrD, DrE:										
Dormont	4R	Severe	Severe	Slight	Moderate	Northern red oak	80	62	250	.81
						Yellow-poplar	96	100	524	1.15
						White ash	80	98	---	---
						Sugar maple	80	50	---	---
						Shortleaf pine	80	130	---	---
Latham	3R	Severe	Severe	Severe	Moderate	Northern red oak	65	48	145	.60
						Black oak	75	57	215	.74
						White oak	75	57	215	.74
						Shortleaf pine	---	---	---	---
FvF: Fiveblock	4R	Severe	Severe	Severe	Moderate	Northern red oak	80	62	250	.81
						Eastern white pine	94	---	---	---
						Yellow-poplar	105	115	650	1.32
						American sycamore	90	---	---	---
						Black locust	---	---	---	---
GuC:										
Gilpin	4A	Slight	Slight	Slight	Moderate	Northern red oak	76	58	222	.75
						Yellow-poplar	93	95	482	1.10
Upshur	3C	Moderate	Moderate	Slight	Severe	Northern red oak	65	48	145	.60
						Yellow-poplar	80	71	320	.83
						Eastern white pine	80	147	---	---
GuD:										
Gilpin	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	80	62	250	.81
						Yellow-poplar	92	93	468	1.07
						Black oak	75	57	215	.74
						Chestnut oak	69	51	173	.65

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/ac	Board feet/ac	Cords/ac
GuD:										
Upshur	4R	Moderate	Severe	Slight	Severe	Northern red oak	72	54	194	0.70
						Yellow-poplar	90	90	440	1.04
						Black oak	---	---	---	---
GuE:										
Gilpin	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	80	62	250	.81
						Yellow-poplar	92	93	468	1.07
Upshur	4R	Severe	Severe	Slight	Severe	Northern red oak	72	54	194	.70
						Yellow-poplar	90	90	440	1.04
						Black oak	---	---	---	---
						Chestnut oak	---	---	---	---
GuF:										
Gilpin	4R	Severe	Severe	Slight	Moderate	Northern red oak	80	62	250	.81
						Yellow-poplar	92	93	468	1.07
Upshur	4R	Severe	Severe	Slight	Severe	Northern red oak	72	54	194	.70
						Yellow-poplar	90	90	440	1.04
						Black oak	---	---	---	---
						Chestnut oak	---	---	---	---
Gw: Grigsby	5A	Slight	Slight	Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	110	124	720	1.42
						White oak	85	67	285	.88
						Black walnut	---	---	---	---
						American sycamore	---	---	---	---
						Sweetgum	---	---	---	---
						Red maple	---	---	---	---
						Hickory	---	---	---	---
Gy: Guyan	4W	Slight	Moderate	Moderate	Severe	Northern red oak	80	62	250	.81
						Yellow-poplar	90	90	440	1.04
						Red maple	80	50	---	---
						American sycamore	---	---	---	---
						Boxelder	---	---	---	---
Hu: Huntington	5A	Slight	Slight	Slight	Severe	Northern red oak	84	66	278	.87
						Yellow-poplar	95	98	510	1.14
KaA, KaB: Kanawha	4A	Slight	Slight	Slight	Moderate	Northern red oak	80	62	250	.81
						Black oak	80	62	250	.81
						Yellow-poplar	90	90	440	1.04
						White ash	80	98	---	---
						Black walnut	---	---	---	---
						Black locust	---	---	---	---
LgC:										
Latham	3C	Slight	Severe	Moderate	Moderate	Northern red oak	63	46	131	.57
						Black oak	65	48	145	.60
						Shortleaf pine	---	---	---	---
						White oak	72	54	194	.70
Gilpin	4A	Slight	Slight	Slight	Moderate	Northern red oak	80	62	250	.81
						Yellow-poplar	95	98	510	1.14

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/ac	Board feet/ac	Cords/ac
LgD:										
Latham	3R	Moderate	Severe	Moderate	Moderate	Northern red oak	65	48	145	0.60
						Black oak	75	57	215	.74
						White oak	75	57	215	.74
						Shortleaf pine	---	---	---	---
Gilpin	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	80	62	250	.81
						Yellow-poplar	92	93	468	1.07
						Black oak	75	57	215	.74
						Chestnut oak	69	51	173	.65
Lo Lobdell	5A	Slight	Slight	Slight	Severe	Northern red oak	87	69	299	.91
						Yellow-poplar	96	100	524	1.15
						Sugar maple	---	---	---	---
						White ash	---	---	---	---
						White oak	---	---	---	---
						Black cherry	---	---	---	---
MaB, MaC Markland	4C	Moderate	Slight	Severe	Moderate	Northern red oak	78	60	236	.78
						White oak	75	57	215	.74
Me Melvin	5W	Slight	Moderate	Severe	Severe	Pin oak	96	78	362	1.03
						Eastern cottonwood	101	---	---	---
						Sweetgum	88	101	---	---
						Green ash	---	---	---	---
						Hackberry	---	---	---	---
						Hickory	---	---	---	---
						Red maple	---	---	---	---
						American elm	---	---	---	---
NeD Nelse	5R	Moderate	Moderate	Moderate	Severe	Northern red oak	85	67	285	.88
						Sweetgum	98	132	---	---
						Boxelder	---	---	---	---
						Silver maple	---	---	---	---
						Black willow	---	---	---	---
						River birch	---	---	---	---
						Green ash	---	---	---	---
						American sycamore	---	---	---	---
PbE:										
Pineville	5R	Moderate	Moderate	Moderate	Severe	Northern red oak	86	68	292	.89
						Yellow-poplar	108	121	692	1.38
						Black oak	85	67	285	.88
						Basswood	---	---	---	---
						Hickory	---	---	---	---
						White oak	63	46	131	.57
Buchanan	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	80	62	250	.81
						Yellow-poplar	90	90	440	1.04

* Average annual growth is equal to total volume growth at rotation divided by rotation age. Actual annual growth varies with stand vigor and other factors. Yield data are based on site indices of natural stands at age 50 years. The International 1/4 Log Rule is used for board feet. Cords are standard rough cords. This information should be used for planning only.

Table 9.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated.)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AgC: Allegheny	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
AsA: Ashton	Severe: flooding.	Slight	Slight	Slight	Slight.
BeC: Beech	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.
BeD: Beech	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: wetness, slope.	Severe: slope.
BeE: Beech	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BuC:					
Beech	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.
Urban land.					
Ca: Chagrin	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
CtA: Cotaco	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
CtB: Cotaco	Severe: flooding.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
DgF:					
Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
DlE:					
Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Latham	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
DPG:					
Dekalb	Severe: slope, small stones, large stones.	Severe: slope, small stones, large stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, slope.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DPG:					
Pineville	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Guyandotte	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope, small stones.
DrD:					
Dormont	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Latham	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
DrE:					
Dormont	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Latham	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
FvF: Fiveblock	Variable	Variable	Variable	Variable	Variable.
GuC:					
Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
Upshur	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
GuD:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GuE, GuF:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Gw: Grigsby	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Gy: Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Hu: Huntington	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
KaA: Kanawha	Severe: flooding.	Slight	Slight	Slight	Slight.
KaB: Kanawha	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
LgC:					
Latham	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
LgD:					
Latham	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Lo: Lobdell	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight	Moderate: flooding.
MaB: Markland	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
MaC: Markland	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Me: Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
NeD: Nelse	Severe: flooding, slope.	Severe: slope.	Severe: slope, flooding.	Moderate: slope, flooding.	Severe: flooding, slope.
PbE:					
Pineville	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: slope.	Severe: slope, small stones.
Buchanan	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: slope.	Severe: slope, small stones.
Ud: Udorthents	Variable	Variable	Variable	Variable	Variable.
UsB: Urban land.					

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
UsB:					
Ashton	Slight	Slight	Moderate: slope.	Slight	Slight.
Lindside	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
UtD:					
Urban land.					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
UvB:					
Urban land.					
Kanawha	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
Cotaco	Severe: flooding.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
UwB:					
Urban land.					
Wheeling	Slight	Slight	Moderate: slope.	Slight	Slight.

Table 10.--Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated.)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AgC---------------- Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AsA---------------- Ashton	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BeC---------------- Beech	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BeD---------------- Beech	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BeE---------------- Beech	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BuC: Beech.										
Urban land.										
Ca----------------- Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CtA---------------- Cotaco	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
CtB---------------- Cotaco	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DgF: Dekalb------------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Gilpin------------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
DlE: Dekalb------------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Latham------------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DPG: Dekalb------------	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Pineville---------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Guyandotte--------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
DrD: Dormont-----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

Table 10.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
DrD:										
Latham	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DrE:										
Dormont	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Latham	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FvF: Fiveblock	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GuC:										
Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Upshur	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuD:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuE:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GuF:										
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Upshur	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Gw: Grigsby	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Gy: Guyan	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Hu: Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KaA: Kanawha	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KaB: Kanawha	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LgC:										
Latham	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

Table 10.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
LgC:										
Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
LgD:										
Latham	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Lo: Lobdell	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MaB: Markland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaC: Markland	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Me: Melvin	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
NeD: Nelse	Poor	Fair	Good	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
PbE:										
Pineville	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Buchanan	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
Ud. Udorthents										
UsB:										
Urban land.										
Ashton.										
Lindside.										
UtD:										
Urban land.										
Gilpin.										
Upshur.										
UvB:										
Urban land.										
Kanawha.										
Cotaco.										
UwB:										
Urban land.										
Wheeling.										

Table 11.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AgC: Allegheny	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
AsA: Ashton	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
BeC: Beech	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope, slippage.	Moderate: shrink-swell, wetness, slope.	Moderate: small stones, wetness, slope.
BeD, BeE: Beech	Severe: wetness, slope, slippage.	Severe: slope, slippage.	Severe: wetness, slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope.
BuC:						
Beech	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope, slippage.	Moderate: shrink-swell, wetness, slope.	Moderate: small stones, wetness, slope.
Urban land.						
Ca: Chagrin	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
CtA, CtB: Cotaco	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: wetness.
DgF:						
Dekalb	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
DlE:						
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Latham	Severe: wetness, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: wetness, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slope.	Severe: slope.
DPG:						
Dekalb	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DPG:						
Pineville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Guyandotte	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
DrD, DrE:						
Dormont	Severe: wetness, slope, slippage.	Severe: slope, slippage.	Severe: wetness, slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage, low strength.	Severe: slope.
Latham	Severe: wetness, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: wetness, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slope.	Severe: slope.
FvF Fiveblock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, large stones.
GuC:						
Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
Upshur	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.
GuD, GuE, GuF:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Gw Grigsby	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Gy Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness.
Hu Huntington	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
KaA, KaB Kanawha	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, low strength.	Slight.
LgC:						
Latham	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope, depth to rock.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LgC:						
Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
LgD:						
Latham	Severe: wetness, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: wetness, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lo: Lobdell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
MaB: Markland	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
MaC: Markland	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
Me: Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
NeD: Nelse	Severe: cutbanks cave, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope, flooding.	Severe: flooding, slope.
PbE:						
Pineville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Buchanan	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Ud. Udorthents						
UsB:						
Urban land.						
Ashton	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
Lindside	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
UtD:						
Urban land.						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
UtD:						
Upshur	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength, slope.	Severe: slope.
UvB:						
Urban land.						
Kanawha	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, low strength.	Slight.
Cotaco	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: wetness.
UwB:						
Urban land.						
Wheeling	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.

Table 12.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AgC: Allegheny	Moderate: depth to rock, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: slope.
AsA: Ashton	Moderate: flooding.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
BeC: Beech	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Poor: small stones.
BeD, BeE: Beech	Severe: wetness, slippage, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: slope.	Poor: small stones, slope.
BuC:					
Beech	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Poor: small stones.
Urban land.					
Ca: Chagrin	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.
CtA, CtB: Cotaco	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: wetness.	Fair: wetness.
DgF:					
Dekalb	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
DlE:					
Dekalb	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, depth to rock.
Latham	Severe: slope, slippage, wetness.	Severe: depth to rock, slope, slippage.	Severe: too clayey, slippage, wetness, slope.	Severe: depth to rock, slope, slippage.	Poor: slope, too clayey, hard to pack, depth to rock.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DPG:					
Dekalb	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Pineville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Guyandotte	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
DrD, DrE:					
Dormont	Severe: wetness, slope, slippage.	Severe: wetness, slope, slippage.	Severe: wetness, slope, slippage, depth to rock.	Severe: slope, slippage.	Poor: slope.
Latham	Severe: slope, slippage, wetness.	Severe: depth to rock, slope, slippage.	Severe: too clayey, slippage, wetness, slope.	Severe: depth to rock, slope, slippage.	Poor: depth to rock, too clayey, slope, hard to pack.
FvF Fiveblock	Severe: slope.	Severe: large stones, slope, seepage.	Severe: large stones, slope, seepage.	Severe: slope, seepage.	Poor: slope.
GuC:					
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, thin layer.
Upshur	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
GuD, GuE, GuF:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, depth to rock, thin layer.
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
Gw Grigsby	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
Gy Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Hu Huntington	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
KaA, KaB: Kanawha	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.
LgC:					
Latham	Severe: depth to rock, percs slowly, wetness.	Severe: depth to rock, slope.	Severe: too clayey, wetness.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, thin layer.
LgD:					
Latham	Severe: slope, wetness, slippage.	Severe: depth to rock, slope, slippage.	Severe: too clayey, wetness, slope, slippage.	Severe: depth to rock, slope, slippage.	Poor: depth to rock, too clayey, slope, hard to pack.
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: depth to rock, slope, thin layer.
Lo: Lobdell	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
MaB: Markland	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
MaC: Markland	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
Me: Melvin	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
NeD: Nelse	Severe: flooding, slope.	Severe: seepage, flooding, slope.	Severe: flooding, seepage, wetness, slope.	Severe: flooding, seepage, slope.	Poor: slope.
PbE:					
Pineville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Buchanan	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Poor: small stones, slope.
Ud. Udorthents					

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
UsB:					
Urban land.					
Ashton	Slight	Moderate: slope, seepage.	Slight	Slight	Good.
Lindside	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
UtD:					
Urban land.					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: depth to rock, slope, thin layer.
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
UvB:					
Urban land.					
Kanawha	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.
Cotaco	Severe: wetness.	Severe: seepage,	Severe: wetness.	Severe: wetness.	Fair: wetness.
UwB:					
Urban land.					
Wheeling	Slight	Severe: seepage.	Severe: seepage.	Slight	Good.

Table 13.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AgC: Allegheny	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, small stones, slope.
AsA: Ashton	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
BeC: Beech	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
BeD: Beech	Fair: shrink-swell, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
BeE: Beech	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
BuC:				
Beech	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Urban land.				
Ca: Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
CtA, CtB: Cotaco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
DgF:				
Dekalb	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, too stony.
Gilpin	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, too stony.
DlE:				
Dekalb	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
DlE:				
Latham	Poor: depth to rock, slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer, slope, small stones.
DPG:				
Dekalb	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, too stony.
Pineville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Severe: small stones, too stony, slope, area reclaim.
Guyandotte	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too stony, area reclaim, slope.
DrD:				
Dormont	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Latham	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer, slope, too clayey.
DrE:				
Dormont	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Latham	Poor: depth to rock, slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer, slope, too clayey.
FvF: Fiveblock	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
GuC:				
Gilpin	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GuD:				
Gilpin	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey, slope.
GuE, GuF:				
Gilpin	Poor: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey, slope.
Gw Grigsby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Gy Guyan	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Hu Huntington	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
KaA, KaB Kanawha	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
LgC:				
Latham	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer, too clayey.
Gilpin	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
LgD:				
Latham	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer, slope, too clayey.
Gilpin	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Lo Lobdell	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
MaB, MaC Markland	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Me-------------------- Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NeD------------------- Nelse	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
PbE:				
Pineville------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too stony, slope.
Buchanan-------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too stony, area reclaim, slope.
Ud. Udorthents				
UsB: Urban land.				
Ashton---------------	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Lindside-------------	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
UtD: Urban land.				
Gilpin---------------	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur---------------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey, slope.
UvB: Urban land.				
Kanawha--------------	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Cotaco---------------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
UwB: Urban land.				
Wheeling-------------	Fair: low strength.	Probable------------	Improbable: excess fines.	Good.

Table 14.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
AgC: Allegheny	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
AsA: Ashton	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.
BeC, BeD, BeE: Beech	Severe: slope, slippage.	Severe: piping.	Slope, slippage.	Slope, slippage, wetness, large stones.	Large stones, slope.
BuC:					
Beech	Severe: slope, slippage.	Severe: piping.	Slope, slippage.	Slope, slippage, wetness, large stones.	Large stones, slope.
Urban land.					
Ca: Chagrin	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
CtA: Cotaco	Moderate: seepage.	Severe: piping, wetness.	Favorable	Erodes easily, wetness.	Erodes easily.
CtB: Cotaco	Moderate: seepage, slope.	Severe: piping, wetness.	Slope	Erodes easily, wetness.	Erodes easily.
DgF:					
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock, droughty.
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
DlE:					
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Slope, depth to rock, large stones, droughty.
Latham	Severe: slope, slippage.	Severe: thin layer.	Slope, slippage.	Slope, slippage, erodes easily, depth to rock.	Slope, depth to rock, erodes easily.
DPG:					
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock, droughty.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
DPG:					
Pineville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Guyandotte	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, large stones.	Slope, large stones.
DrD, DrE:					
Dormont	Severe: slope, slippage.	Moderate: piping, large stones, wetness.	Slope, slippage.	Slippage, slope, erodes easily.	Slope, erodes easily.
Latham	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slippage.	Slope, depth to rock, erodes easily, slippage.	Slope, depth to rock, erodes easily.
FvF: Fiveblock	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
GuC, GuD, GuE, GuF:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Upshur	Severe: slope, slippage.	Severe: hard to pack.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Gw: Grigsby	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Gy: Guyan	Moderate: seepage.	Severe: wetness.	Favorable	Wetness	Wetness.
Hu: Huntington	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
KaA, KaB: Kanawha	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
LgC, LgD:					
Latham	Severe: depth to rock, slope.	Severe: thin layer.	Slope, slippage.	Slope, depth to rock, erodes easily, slippage.	Slope, depth to rock, erodes easily.
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Lo: Lobdell	Severe: seepage.	Severe: piping.	Flooding.	Erodes easily, wetness.	Erodes easily.
MaB: Markland	Moderate: slope.	Severe: hard to pack.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
MaC: Markland	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Me: Melvin	Moderate: seepage.	Severe: piping, wetness.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
NeD: Nelse	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope	Slope, droughty, rooting depth.
PbE:					
Pineville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Buchanan	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, percs slowly, rooting depth.	Percs slowly, slope, rooting depth.
Ud. Udorthents					
UsB:					
Urban land.					
Ashton	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.
Lindside	Severe: seepage.	Severe: piping.	Favorable	Erodes easily, wetness.	Erodes easily.
UtD:					
Urban land.					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Upshur	Severe: slope, slippage.	Severe: hard to pack.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
UvB:					
Urban land.					
Kanawha	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Cotaco	Moderate: seepage, slope.	Severe: piping, wetness.	Slope	Erodes easily, wetness.	Erodes easily.
UwB:					
Urban land.					
Wheeling	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.

Table 15.--Engineering Index Properties

(The symbol < means less than. Absence of an entry indicates that data were not estimated.)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
AgC: Allegheny	0-9	Loam	ML, CL, CL-ML	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	9-46	Loam, clay loam, sandy clay loam, fine sandy loam, channery fine sandy loam.	ML, CL, SC, SM	A-4, A-6	0	65-100	65-100	65-95	35-80	<35	NP-15
	46-55	Silt loam, loam, sandy loam, channery silt loam.	ML, SM, CL, SC	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
AsA: Ashton	0-10	Silt loam	ML	A-4	0	95-100	90-100	75-100	60-95	<35	NP-10
	10-48	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	95-100	90-100	85-100	80-100	25-42	5-20
	48-65	Silt loam, loam, fine sandy loam.	ML, CL, SM, CL-ML	A-4, A-6	0-5	90-100	85-100	65-95	40-90	<40	NP-20
BeC, BeD, BeE: Beech	0-9	Loam	ML, CL, CL-ML	A-4, A-6	0-5	65-95	60-90	55-85	45-80	20-35	4-10
	9-51	Channery loam, channery clay loam, very channery loam.	ML, CL, SC, GM	A-2, A-4, A-6	0-20	45-90	40-85	35-80	30-65	25-40	7-14
	51-65	Very channery loam, very channery silt loam, channery clay loam.	ML, CL, SC, GM	A-2, A-4, A-6	5-25	40-85	35-80	30-75	25-65	25-40	7-14
BuC:											
Beech	0-9	Loam	ML, CL, CL-ML	A-4, A-6	0-5	65-95	60-90	55-85	45-80	20-35	4-10
	9-51	Channery loam, channery clay loam, very channery loam.	ML, CL, SC, GM	A-2, A-4, A-6	0-20	45-90	40-85	35-80	30-65	25-40	7-14
	51-65	Very channery loam, very channery silt loam, channery clay loam.	ML, CL, SC, GM	A-2, A-4, A-6	5-25	40-85	35-80	30-75	25-65	25-40	7-14
Urban land.											
Ca: Chagrin	0-8	Silt loam	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
	8-45	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	45-65	Stratified silt loam to gravelly fine sand.	ML, SM, SP-SM	A-4, A-2	0	75-100	65-100	40-85	10-80	20-40	NP-10

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
CtA, CtB--------- Cotaco	0-12	Loam-------------	ML, CL-ML, SM, SC-SM	A-4	0-5	80-100	75-95	55-85	35-80	<30	NP-7
	12-39	Loam, silt loam, clay loam.	SC, ML, CL, CL-ML	A-2, A-4, A-6, A-1-b	0-10	60-100	50-95	40-90	20-80	<35	NP-15
	39-65	Clay loam, loam, channery loam.	SC, ML, GC, CL, CL-ML	A-2, A-4, A-6, A-1-b	0-10	60-100	50-95	40-90	20-80	<35	NP-15
DgF:											
Dekalb----------	0-4	Very stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	10-30	50-90	45-80	40-75	20-55	10-32	NP-10
	4-33	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-9
	33	Unweathered bedrock.									
Gilpin----------	0-6	Very stony silt loam.	GC, CL, ML, CL-ML	A-2, A-4, A-6	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	6-22	Silt loam, channery silt loam, channery silty clay loam, silty clay loam.	GM-GC, CL, CL-ML	A-2, A-4, A-5	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22	Unweathered bedrock.									
DlE:											
Dekalb----------	0-4	Channery sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	4-33	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	33	Unweathered bedrock.									
Latham----------	0-4	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
	4-34	Channery silty clay loam, silty clay, silty clay loam, channery silty clay, channery silt loam.	CH, CL, GC	A-7, A-6	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	34	Weathered bedrock									

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
DPG:											
Dekalb----------	0-4	Extremely stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	15-30	50-90	45-80	40-75	20-55	10-32	NP-10
	4-33	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-9
	33	Unweathered bedrock.									
Pineville-------	0-5	Extremely stony loam.	ML, CL-ML, SM, SC-SM	A-2, A-4	15-30	55-90	50-85	45-80	30-75	25-35	4-10
	5-53	Channery loam, channery clay loam, very channery loam.	CL, CL-ML, SC, SC-SM, GM-GC	A-2, A-4, A-6	0-10	55-85	50-80	45-75	30-65	25-40	6-15
	53-65	Very channery loam, very channery clay loam, very channery sandy loam.	GM, GM-GC, SC, SC-SM	A-1, A-2, A-4, A-6	5-20	35-75	30-70	25-65	20-60	25-35	4-12
Guyandotte------	0-13	Extremely stony loam.	GM-GC, SC-SM, CL-ML, ML	A-1, A-2, A-4	20-50	25-65	20-60	15-55	10-55	20-30	NP-8
	13-65	Very channery loam, channery loam, extremely channery loam.	GM-GC, GM, CL-ML, ML	A-1, A-2, A-4	5-35	25-65	20-60	15-55	10-55	20-30	NP-8
DrD, DrE:											
Dormont---------	0-7	Silt loam--------	ML, CL	A-4, A-6	0	80-100	75-100	75-95	70-85	25-39	9-15
	7-23	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	80-100	75-95	75-90	70-85	25-39	9-15
	23-40	Channery silty clay loam, clay, silty clay.	ML, CL, MH, CH	A-6, A-7	0	70-100	60-90	55-85	55-80	35-55	12-25
	40-54	Very channery silty clay loam, silt loam, channery silty clay loam, clay.	ML, CL, MH, GM-GC	A-2, A-4, A-6, A-7	0-5	60-100	35-90	35-80	30-80	30-55	9-25
	54	Weathered bedrock									
Latham----------	0-4	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
	4-34	Channery silty clay loam, silty clay, silty clay loam, channery silty clay, channery silt loam.	CH, CL, GC	A-7, A-6	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	34	Weathered bedrock									

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
FvF-------------- Fiveblock	0-9	Very stony sandy loam.	SM, SC-SM, GM-GC, GM	A-1, A-2	15-30	55-70	50-65	35-50	10-25	15-25	NP-7
	9-65	Extremely channery sandy loam, very stony sandy loam, very channery sandy loam.	SM, SC-SM, GM-GC, GM	A-1, A-2	5-30	45-65	25-50	15-35	10-20	15-25	NP-7
GuC, GuD, GuE, GuF:											
Gilpin---------	0-6	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-22	Silt loam, channery silt loam, channery silty clay loam, silty clay loam.	GM-GC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22	Unweathered bedrock.									
Upshur---------	0-8	Silt loam--------	CL-ML, ML, CL	A-6, A-4	0	85-100	85-100	85-100	65-90	25-40	5-15
	8-40	Silty clay, channery clay, clay.	MH, CH, CL	A-7	0	75-100	75-100	75-100	70-100	45-70	20-40
	40-45	Very channery clay, silty clay loam, silty clay, clay.	CL, MH, CH, GL	A-6, A-7	0	40-100	40-100	40-100	40-95	35-55	11-25
	45	Weathered bedrock									
Gw--------------- Grigsby	0-7	Loam-------------	ML, CL-ML, CL	A-4	0-5	80-100	80-100	70-100	50-80	<25	NP-10
	7-42	Loam, sandy loam, fine sandy loam, silt loam.	ML, SM, SC, CL-ML	A-2, A-4	0-5	80-100	80-100	70-100	30-70	<25	NP-10
	42-65	Sandy loam, loam, gravelly sandy loam, fine sandy loam.	SM, SC-SM, ML, GM	A-2, A-1, A-4	0-30	40-100	30-100	25-100	20-70	<20	NP-5
Gy--------------- Guyan	0-10	Silt loam--------	ML, CL-ML	A-4	0	95-100	95-100	95-100	65-80	20-30	5-10
	10-65	Loam, clay loam, silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	85-100	85-100	80-100	70-95	25-40	8-17
Hu--------------- Huntington	0-17	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	17-32	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	32-65	Stratified fine sand to silty clay loam.	SM, SC, ML, CL	A-2, A-4	0-10	95-100	60-100	50-90	30-75	<30	NP-10

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
KaA, KaB--------- Kanawha	0-9	Loam-------------	ML, CL, CL-ML	A-4	0	80-100	75-100	65-100	50-90	20-35	2-10
	9-40	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-2, A-4, A-6	0	80-100	75-100	60-100	25-80	20-40	3-15
	40-65	Stratified loamy sand to sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	60-100	55-100	40-95	20-60	20-35	2-12
LgC, LgD: Latham----------	0-4	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
	4-34	Silty clay, silty clay loam, channery silty clay loam, channery silty clay, channery silt loam.	CH, CL, GC	A-7, A-6	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	34	Weathered bedrock									
Gilpin----------	0-6	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-22	Silt loam, channery silt loam, channery silty clay loam, silty clay loam.	GC, ML, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22	Unweathered bedrock.									
Lo--------------- Lobdell	0-6	Loam-------------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-100	65-90	20-30	NP-8
	6-38	Loam, silt loam	ML, CL-ML	A-4	0	90-100	80-100	70-95	55-85	20-35	NP-10
	38-65	Stratified sandy loam to silt loam.	ML, SM, CL-ML, CL	A-4	0	90-100	80-100	65-85	40-80	15-35	NP-10
MaB, MaC--------- Markland	0-8	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	8-39	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	19-32
	39-65	Stratified clay to silty clay loam.	CL, CH, CL-ML, MH	A-7	0	100	100	90-100	75-95	40-55	15-25
Me--------------- Melvin	0-6	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	6-22	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	95-100	90-100	80-100	80-98	25-40	5-20
	22-65	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	60-98	25-40	5-20

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
NeD: Nelse	0-11	Silt loam	CL, CL-ML, ML	A-6, A-4	0-5	85-100	85-100	65-90	50-80	<25	NP-5
	11-55	Fine sandy loam, sandy loam, loamy sand, loamy fine sand.	SM, SC-SM	A-2-4, A-4	0-5	95-100	90-100	60-85	25-45	<20	NP-5
	55-65	Loamy sand, fine sandy loam, loamy fine sand, sandy loam.	SM, SC-SM	A-2-4	0-5	95-100	90-100	60-85	15-30	<20	NP
PbE:											
Pineville	0-5	Extremely stony loam.	ML, CL-ML, SM, SC-SM	A-2, A-4	15-30	55-90	50-85	45-80	30-75	25-35	4-10
	5-53	Channery loam, channery clay loam, very channery loam.	CL, CL-ML, SC, SC-SM, GM-GC	A-2, A-4, A-6	0-10	55-85	50-80	45-75	30-65	25-40	6-15
	53-65	Very channery loam, very channery clay loam, very channery sandy loam.	GM, GM-GC, SC, SC-SM	A-1, A-2, A-4, A-6	5-20	35-75	30-70	25-65	20-60	25-35	4-12
Buchanan	0-5	Extremely stony loam.	GM, ML, GM-GC, CL-ML	A-2, A-4	5-20	50-85	45-70	40-70	30-60	20-35	2-11
	5-28	Channery loam, loam, channery sandy clay loam.	GM, ML, CL-ML, CL	A-2, A-4	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	28-65	Very channery loam, channery loam, channery clay loam, channery sandy clay loam.	GM, ML, GC-GM, CL-ML, SC-SM	A-2, A-4, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15
Ud. Udorthents											
UsB: Urban land.											
Ashton	0-10	Silt loam	ML	A-4	0	95-100	90-100	75-100	60-95	<35	NP-10
	10-48	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	80-100	25-42	5-20
	48-65	Silt loam, loam, fine sandy loam.	ML, CL, SM, CL-ML	A-4, A-6	0-5	90-100	85-100	65-95	40-90	<40	NP-20
Lindside	0-9	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	9-37	Silty clay loam, silt loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
	37-65	Stratified silty clay loam to gravelly sandy loam.	CL, ML, SM, SC	A-2, A-4, A-6	0	60-100	55-100	45-100	30-95	20-40	4-18

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
UtD:											
Urban land.											
Gilpin----------	0-6	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-22	Silt loam, channery silt loam, channery silty clay loam, silty clay loam.	GC, CL, CL-ML, GM-GC	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22	Unweathered bedrock.									
Upshur----------	0-8	Silt loam--------	CL-ML, ML, CL	A-6, A-4	0	85-100	85-100	85-100	65-90	25-40	5-15
	8-40	Silty clay, channery clay, clay.	MH, CH, CL	A-7	0	75-100	75-100	75-100	70-100	45-70	20-40
	40-45	Very channery clay, silty clay loam, silty clay, clay.	CL, MH, CH, GC	A-6, A-7	0	40-100	40-100	40-100	40-95	35-55	11-25
	45	Weathered bedrock									
UvB:											
Urban land.											
Kanawha---------	0-9	Loam-------------	ML, CL, CL-ML	A-4	0	80-100	75-100	65-100	50-90	20-35	2-10
	9-40	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-2, A-4, A-6	0	80-100	75-100	60-100	25-80	20-40	3-15
	40-65	Stratified loamy sand to sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	60-100	55-100	40-95	20-60	20-35	2-12
Cotaco----------	0-12	Loam-------------	ML, CL-ML, SM, SC-SM	A-4	0-5	80-100	75-95	55-85	35-80	<30	NP-7
	12-39	Loam, silt loam, clay loam.	SC, ML, CL, CL-ML	A-2, A-4, A-6, A-1-b	0-10	60-100	50-95	40-90	20-80	<35	NP-15
	39-65	Clay loam, loam, channery loam. loam.	SC, ML, GC, CL CL-ML	A-2, A-4, A-6, A-1-b	0-10	60-100	50-95	40-90	20-80	<35	NP-15
UwB:											
Urban land.											
Wheeling--------	0-8	Loam-------------	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	8-49	Loam, sandy loam, very fine sandy loam.	ML, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	49-65	Stratified loamy sand to loam.	SM, ML, SC	A-1, A-2, A-3, A-4	0-20	65-100	65-100	55-90	4-45	<20	NP-10

Table 16.--Physical and Chemical Properties of the Soils

(The symbol < means less than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated.)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AgC-------------- Allegheny	0-9	15-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low----------	0.32	4	1-4
	9-46	18-35	1.20-1.50	0.6-2.0	0.10-0.19	3.6-5.5	Low----------	0.28		
	46-55	10-35	1.20-1.50	0.6-2.0	0.08-0.17	3.6-5.5	Low----------	0.28		
AsA-------------- Ashton	0-10	10-25	1.20-1.40	0.6-2.0	0.14-0.23	5.6-7.3	Low----------	0.32	5	2-4
	10-48	18-34	1.20-1.50	0.6-2.0	0.13-0.23	5.6-7.3	Low----------	0.43		
	48-65	10-40	1.25-1.55	0.6-2.0	0.14-0.20	5.6-7.3	Low----------	0.43		
BeC, BeD, BeE---- Beech	0-9	10-27	1.20-1.40	0.6-2.0	0.11-0.20	4.5-6.0	Low----------	0.28	5	1-4
	9-51	18-35	1.30-1.60	0.2-2.0	0.09-0.16	4.5-6.0	Moderate-----	0.24		
	51-65	15-35	1.30-1.60	0.2-2.0	0.08-0.13	4.5-6.0	Moderate-----	0.20		
BuC:										
Beech-----------	0-9	10-27	1.20-1.40	0.6-2.0	0.11-0.20	4.5-6.0	Low----------	0.28	5	1-4
	9-51	18-35	1.30-1.60	0.2-2.0	0.09-0.16	4.5-6.0	Moderate-----	0.24		
	51-65	15-35	1.30-1.60	0.2-2.0	0.08-0.13	4.5-6.0	Moderate-----	0.20		
Urban land.										
Ca--------------- Chagrin	0-8	10-27	1.20-1.40	0.6-2.0	0.14-0.24	5.6-7.3	Low----------	0.32	5	2-4
	8-45	18-30	1.20-1.50	0.6-2.0	0.13-0.20	5.6-7.3	Low----------	0.32		
	45-65	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low----------	0.32		
CtA, CtB--------- Cotaco	0-12	7-27	1.20-1.40	0.6-6.0	0.12-0.20	3.6-5.5	Low----------	0.37	3	.5-4
	12-39	18-35	1.20-1.50	0.6-2.0	0.07-0.20	3.6-5.5	Low----------	0.28		
	39-65	18-35	1.20-1.50	0.6-2.0	0.07-0.20	3.6-5.5	Low----------	0.28		
DgF:										
Dekalb----------	0-4	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low----------	0.17	2	2-5
	4-33	7-18	1.20-1.50	6.0-20	0.05-0.12	3.6-5.5	Low----------	0.17		
	33	---	---	---	---	---	-------------	----		
Gilpin----------	0-6	15-27	1.20-1.40	0.6-2.0	0.08-0.19	3.6-5.5	Low----------	0.24	3	---
	6-22	18-35	1.20-1.50	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24		
	22	---	---	---	---	---	-------------	----		
DlE:										
Dekalb----------	0-4	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low----------	0.17	2	2-4
	4-33	7-18	1.20-1.50	6.0-20	0.05-0.12	3.6-5.5	Low----------	0.17		
	33	---	---	---	---	---	-------------	----		
Latham----------	0-4	20-27	1.30-1.50	0.6-2.0	0.13-0.20	3.6-5.5	Low----------	0.43	3	1-3
	4-34	35-55	1.40-1.70	0.06-0.2	0.10-0.17	3.6-5.0	High---------	0.32		
	34	---	---	---	---	---	-------------	----		
DPG:										
Dekalb----------	0-4	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low----------	0.17	2	2-5
	4-33	7-18	1.20-1.50	6.0-20	0.05-0.12	3.6-5.5	Low----------	0.17		
	33	---	---	---	---	---	-------------	----		
Pineville-------	0-5	15-25	1.00-1.30	0.6-2.0	0.10-0.16	3.6-7.3	Low----------	0.20	4	.5-5
	5-53	18-30	1.30-1.60	0.6-2.0	0.08-0.14	3.6-5.5	Low----------	0.15		
	53-65	15-30	1.30-1.60	0.6-6.0	0.06-0.14	3.6-5.5	Low----------	0.15		
Guyandotte------	0-13	5-27	1.00-1.30	0.6-6.0	0.10-0.16	4.5-7.3	Low----------	0.10	4	2-10
	13-65	5-27	1.30-1.60	0.6-6.0	0.05-0.15	4.5-6.0	Low----------	0.17		

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
DrD, DrE:										
Dormont	0-7	18-27	1.20-1.40	0.6-2.0	0.13-0.20	4.5-6.0	Low	0.43	3	2-4
	7-23	20-40	1.40-1.60	0.2-2.0	0.13-0.18	4.5-6.0	Moderate	0.43		
	23-40	28-55	1.40-1.60	0.06-0.6	0.11-0.18	5.1-6.0	Moderate	0.32		
	40-54	20-50	1.30-1.60	0.06-2.0	0.08-0.12	5.1-6.0	Moderate	0.17		
	54	---	---	---	---	---	-------------	----		
Latham	0-4	20-27	1.30-1.50	0.6-2.0	0.13-0.20	3.6-5.5	Low	0.43	3	1-3
	4-34	35-55	1.40-1.70	0.06-0.2	0.10-0.17	3.6-5.0	High	0.32		
	34	---	---	---	---	---	-------------	----		
FvF: Fiveblock	0-9	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low	0.32	5	<.5
	9-65	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low	0.32		
GuC, GuD, GuE, GuF:										
Gilpin	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.19	3.6-5.5	Low	0.32	3	.5-4
	6-22	18-35	1.20-1.50	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24		
	22	---	---	---	---	---	-------------	----		
Upshur	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.19	4.5-6.5	Moderate	0.43	3	1-4
	8-40	40-55	1.30-1.60	0.06-0.2	0.10-0.19	4.5-6.0	High	0.32		
	40-45	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32		
	45	---	---	---	---	---	-------------	----		
Gw: Grigsby	0-7	5-25	1.20-1.40	0.6-6.0	0.10-0.20	5.6-7.3	Low	0.32	5	1-4
	7-42	5-18	1.20-1.50	0.6-6.0	0.10-0.20	5.6-7.3	Low	0.28		
	42-65	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.1-7.3	Low	0.28		
Gy: Guyan	0-10	12-25	1.20-1.40	0.6-2.0	0.14-0.22	5.1-7.3	Low	0.32	4	1-3
	10-65	20-35	1.25-1.55	0.6-2.0	0.14-0.20	4.5-5.5	Low	0.37		
Hu: Huntington	0-17	18-27	1.10-1.30	0.6-2.0	0.14-0.24	5.6-7.8	Low	0.28	5	3-6
	17-32	18-30	1.30-1.50	0.6-2.0	0.14-0.22	5.6-7.8	Low	0.32		
	32-65	15-30	1.30-1.50	0.6-2.0	0.10-0.19	5.6-7.8	Low	0.28		
KaA, KaB: Kanawha	0-9	10-20	1.20-1.40	0.6-2.0	0.13-0.22	5.1-6.0	Low	0.32	4	2-4
	9-40	18-35	1.30-1.50	0.6-2.0	0.14-0.20	5.6-6.5	Low	0.28		
	40-65	15-45	1.30-1.50	0.6-6.0	0.10-0.18	5.6-6.5	Low	0.24		
LgC, LgD:										
Latham	0-4	20-27	1.30-1.50	0.6-2.0	0.13-0.20	3.6-5.5	Low	0.43	3	1-3
	4-34	35-55	1.40-1.70	0.06-0.2	0.10-0.17	3.6-5.0	High	0.32		
	34	---	---	0.0-0.2	---	---	-------------	----		
Gilpin	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.19	3.6-5.5	Low	0.32	3	.5-4
	6-22	18-35	1.20-1.50	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24		
	22	---	---	0.2-2.0	---	---	-------------	----		
Lo: Lobdell	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.24	5.1-7.3	Low	0.37	5	1-3
	6-38	18-30	1.25-1.60	0.6-2.0	0.14-0.22	5.1-7.3	Low	0.37		
	38-65	15-30	1.20-1.60	0.6-6.0	0.12-0.18	5.6-7.3	Low	0.37		
MaB, MaC: Markland	0-8	20-27	1.30-1.45	0.6-2.0	0.14-0.24	5.6-7.3	Low	0.43	3	1-3
	8-39	40-55	1.55-1.70	0.06-0.2	0.11-0.20	5.1-7.8	High	0.32		
	39-65	35-50	1.55-1.70	0.06-0.2	0.09-0.20	7.4-8.4	High	0.32		
Me: Melvin	0-6	12-17	1.20-1.60	0.6-2.0	0.14-0.23	5.6-7.8	Low	0.43	5	.5-3
	6-22	12-35	1.30-1.60	0.6-2.0	0.14-0.23	5.6-7.8	Low	0.43		
	22-65	7-40	1.40-1.70	0.6-2.0	0.14-0.23	5.6-7.8	Low	0.43		

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
NeD-------------- Nelse	0-11	5-25	1.20-1.60	2.0-6.0	0.09-0.20	5.1-8.4	Low----------	0.17	5	2-10
	11-55	2-18	1.40-1.80	2.0-20	0.08-0.14	5.1-8.4	Low----------	0.15		
	55-65	2-18	1.40-1.80	2.0-20	0.05-0.10	5.1-8.4	Low----------	0.15		
PbE:										
Pineville-------	0-5	15-25	1.00-1.30	0.6-2.0	0.10-0.16	3.6-7.3	Low----------	0.20	4	.5-5
	5-53	18-30	1.30-1.60	0.6-2.0	0.08-0.14	3.6-5.5	Low----------	0.15		
	53-65	15-30	1.30-1.60	0.6-6.0	0.06-0.14	3.6-5.5	Low----------	0.15		
Buchanan--------	0-5	10-27	1.20-1.40	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	3-2	1-4
	5-28	18-30	1.30-1.60	0.6-2.0	0.09-0.16	3.6-5.5	Low----------	0.24		
	28-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.6-5.5	Low----------	0.17		
Ud. Udorthents										
UsB: Urban land.										
Ashton----------	0-10	10-25	1.20-1.40	0.6-2.0	0.14-0.23	5.6-7.3	Low----------	0.32	5	2-4
	10-48	18-34	1.20-1.50	0.6-2.0	0.13-0.23	5.6-7.3	Low----------	0.43		
	48-65	10-40	1.25-1.55	0.6-2.0	0.14-0.20	5.6-7.3	Low----------	0.43		
Lindside--------	0-9	15-27	1.20-1.40	0.6-2.0	0.14-0.26	5.1-7.8	Low----------	0.32	5	2-4
	9-37	18-35	1.20-1.40	0.2-2.0	0.14-0.22	5.1-7.8	Low----------	0.37		
	37-65	18-35	1.20-1.40	0.2-6.0	0.12-0.18	5.6-7.8	Low----------	0.32		
UtD: Urban land.										
Gilpin----------	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.19	3.6-5.5	Low----------	0.32	3	.5-4
	6-22	18-35	1.20-1.50	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24		
	22	---	---	---	---	---	-------------	----		
Upshur----------	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.19	4.5-6.5	Moderate-----	0.43	3	1-4
	8-40	40-55	1.30-1.60	0.06-0.2	0.10-0.19	4.5-6.0	High---------	0.32		
	40-45	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	45	---	---	---	---	---	-------------	----		
UvB: Urban land.										
Kanawha---------	0-9	10-20	1.20-1.40	0.6-2.0	0.13-0.22	5.1-6.0	Low----------	0.32	4	2-4
	9-40	18-35	1.30-1.50	0.6-2.0	0.14-0.20	5.6-6.5	Low----------	0.28		
	40-65	15-45	1.30-1.50	0.6-6.0	0.10-0.18	5.6-6.5	Low----------	0.24		
Cotaco----------	0-12	7-27	1.20-1.40	0.6-6.0	0.12-0.20	3.6-5.5	Low----------	0.37	3	.5-4
	12-39	18-35	1.20-1.50	0.6-2.0	0.07-0.20	3.6-5.5	Low----------	0.28		
	39-65	18-35	1.20-1.50	0.6-2.0	0.07-0.20	3.6-5.5	Low----------	0.28		
UwB: Urban land.										
Wheeling--------	0-8	12-20	1.20-1.40	0.6-6.0	0.12-0.19	5.1-6.0	Low----------	0.37	4	1-3
	8-49	18-30	1.30-1.50	0.6-2.0	0.08-0.19	5.1-6.0	Low----------	0.32		
	49-65	8-15	1.30-1.50	2.0-6.0	0.04-0.11	5.1-6.0	Low----------	0.20		

Table 17.--Soil and Water Features

("Flooding," "water table," and such terms as "rare," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
			Ft			In			
AgC--------------- Allegheny	B	None------------	>6.0	---	---	48-60	Hard	Low------	High.
AsA--------------- Ashton	B	Rare------------	>6.0	---	---	>60	---	Low------	Low.
BeC, BeD, BeE----- Beech	C	None------------	1.5-3.0	Perched	Feb-Apr	>60	---	Moderate	Moderate.
BuC:									
Beech------------	C	None------------	1.5-3.0	Perched	Feb-Apr	>60	---	Moderate	Moderate.
Urban land.									
Ca---------------- Chagrin	B	Occasional------	4.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.
CtA, CtB---------- Cotaco	C	Rare------------	1.5-2.5	Apparent	Nov-May	>60	---	Moderate	High.
DgF:									
Dekalb-----------	C	None------------	>6.0	---	---	20-40	Hard	Low------	High.
Gilpin-----------	C	None------------	>6.0	---	---	20-40	Soft	Low------	High.
DlE:									
Dekalb-----------	C	None------------	>6.0	---	---	20-40	Hard	Low------	High.
Latham-----------	D	None------------	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High-----	High.
DPG:									
Dekalb-----------	C	None------------	>6.0	---	---	20-40	Hard	Low------	High.
Pineville--------	B	None------------	>6.0	---	---	>60	---	Low------	High.
Guyandotte-------	B	None------------	>6.0	---	---	>60	---	Low------	High.
DrD, DrE:									
Dormont----------	C	None------------	1.5-3.0	Perched	Feb-Mar	48-60	Soft	High-----	Moderate.
Latham-----------	D	None------------	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High-----	High.
FvF--------------- Fiveblock	C	None------------	>6.0	---	---	>60	---	Low------	Low.
GuC, GuD, GuE, GuF:									
Gilpin----------	C	None------------	>6.0	---	---	20-40	Soft	Low------	High.
Upshur----------	D	None------------	>6.0	---	---	40-60	Soft	High-----	Moderate.
Gw---------------- Grigsby	B	Occasional------	3.5-6.0	Apparent	Jan-Apr	>60	---	Low------	Low.

Table 17.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
			Ft			In			
Gy---------------- Guyan	C	None------------	0.5-1.5	Apparent	Nov-May	>60	---	High-----	Moderate.
Hu---------------- Huntington	B	Frequent--------	>6.0	---	---	>60	---	Low------	Moderate.
KaA, KaB---------- Kanawha	B	Rare------------	>6.0	---	---	>60	---	Low------	Moderate.
LgC, LgD:									
Latham-----------	D	None------------	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High-----	High.
Gilpin-----------	C	None------------	>6.0	---	---	20-40	Soft	Low------	High.
Lo---------------- Lobdell	B	Occasional------	1.5-3.0	Apparent	Dec-Apr	>60	---	Low------	Moderate.
MaB, MaC---------- Markland	C	None------------	1.5-3.0	Perched	Mar-Apr	>60	---	High-----	Moderate.
Me---------------- Melvin	D	Occasional------	0-1.0	Apparent	Dec-May	>60	---	High-----	Low.
NeD--------------- Nelse	B	Frequent--------	4.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.
PbE:									
Pineville--------	B	None------------	>6.0	---	---	>60	---	Low------	High.
Buchanan---------	C	None------------	1.5-3.0	Perched	Nov-Mar	>60	---	High-----	High.
Ud. Udorthents									
UsB: Urban land.									
Ashton-----------	B	None------------	>6.0	---	---	>60	---	Low------	Low.
Lindside---------	C	None------------	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
UtD: Urban land.									
Gilpin-----------	C	None------------	>6.0	---	---	20-40	Soft	Low------	High.
Upshur-----------	D	None------------	>6.0	---	---	>40	Soft	High-----	Moderate.
UvB: Urban land.									
Kanawha----------	B	Rare------------	>6.0	---	---	>60	---	Low------	Moderate.
Cotaco-----------	C	Rare------------	1.5-2.5	Apparent	Nov-May	>60	---	Moderate	High.
UwB: Urban land.									
Wheeling---------	B	None------------	>6.0	---	---	>60	---	Low------	Moderate.

Table 18.--Classification of the Soils

Soil name	Family or higher taxonomic class
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Ashton	Fine-silty, mixed, mesic Mollic Hapludalfs
Beech	Fine-loamy, mixed, mesic Ultic Hapludalfs
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Cotaco	Fine-loamy, mixed, mesic Aquic Hapludults
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Dormont	Fine-loamy, mixed, mesic Ultic Hapludalfs
Fiveblock	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Grigsby	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Guyan	Fine-loamy, mixed, mesic Aeric Ochraquults
Guyandotte	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Huntington	Fine-silty, mixed, mesic Fluventic Hapludolls
Kanawha	Fine-loamy, mixed, mesic Typic Hapludalfs
Latham	Clayey, mixed, mesic Aquic Hapludults
Lindside	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Lobdell	Fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Markland	Fine, mixed, mesic Typic Hapludalfs
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Nelse	Coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents
Pineville	Fine-loamy, mixed, mesic Typic Hapludults
Udorthents	Udorthents
Upshur	Fine, mixed, mesic Typic Hapludalfs
Wheeling	Fine-loamy, mixed, mesic Ultic Hapludalfs

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